

EUROPEAN HOSPITAL

THE EUROPEAN FORUM FOR THOSE IN THE BUSINESS OF MAKING HEALTHCARE WORK

Existing solutions need to mature, experts find

Interactive mobile cancer apps: promising, but formative

Interactive mobile apps have become ubiquitous in daily life. The Covid-19 pandemic has escalated the use of disease-specific monitoring apps. Mobile apps enabling cancer patients to self-manage their physical condition and symptoms can help them to evaluate toxic side effects of their treatments, offer artificial intelligence (AI)-generated recommendations to minimize them, and alert them to symptom severity requiring medical intervention.

patients to input data related to symptoms they were experiencing, but only six analysed this data and provided medical advice based on users' answers. Only five apps allowed patients to input their own symptoms in addition to the aver-

gests that increased focus on the cancer patient experience beyond the clinic and hospital is required. 'We need to better understand the lived experience, environment, and behaviours of our patients before and after cancer treatment, so that we can assess and predict "trajectories" of care. Mobile apps are ideally positioned to allow for the collection of such data both passively and actively.'

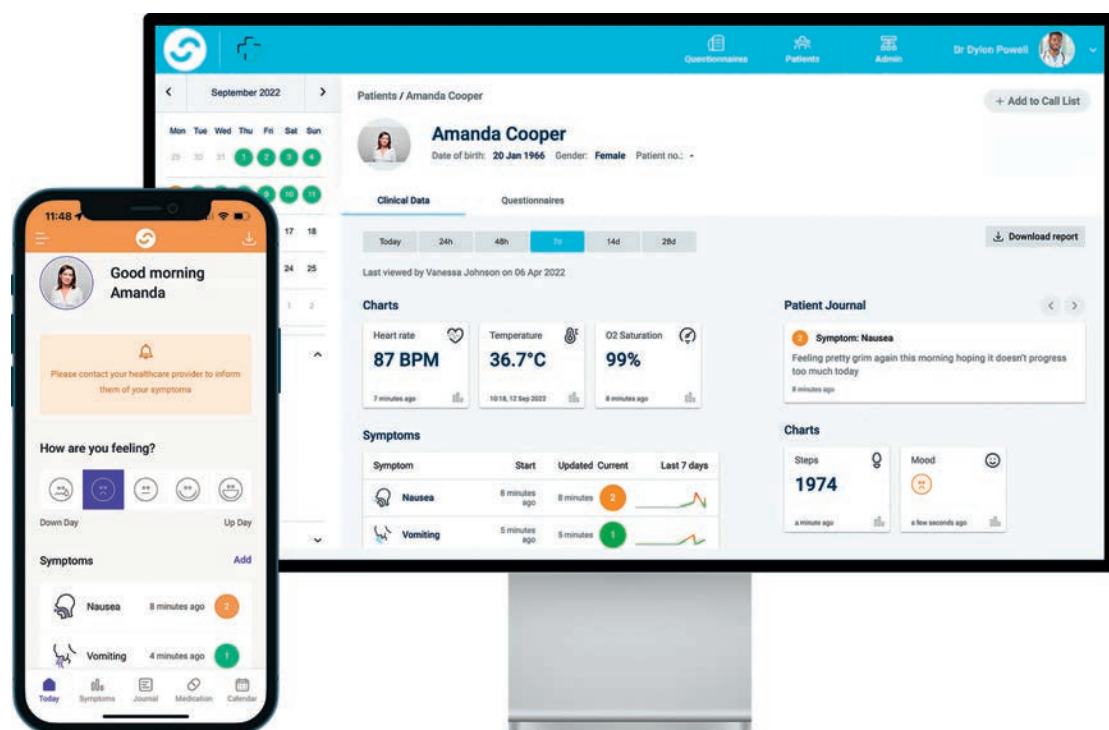
founder and CEO. 'We have built digital cancer care solutions that allow patient record data and information to flow securely and effectively between systems. A seamless digital cancer care pathway is now vital for our healthcare system.'

Carevive, an oncology-focused health tech company headquartered in Boston, US, licenses its multi-tiered configurable ePROM cancer app to cancer centres in the US for their patients' use. The app provides automated personalized care plans for patients regarding self-care, cancer centre resources and feedback, and emergency guidance. It offers remote symptom monitoring and management features to proactively address cancer symptoms before they become severe.

The company offers various level of integration of patient-inputted data to cancer centres, depending on the EHR in use. 'EHR integration is dependent on the desired clinical workflow and IT resources. Not all cancer centres define integration as the same,' says Madelyn Trupkin Herzfeld, Carevive founder and Vice Chairman. 'Our deepest integration is with Oracle Health (Cerner), where data are shared bidirectionally, and workflow tools are integrated.'

For sites that have built workflow integrations, the care team can access the Carevive tab in the EHR to view a dashboard of longitudinal week-to-week trends of patient symptoms. PRO data is also populated on the EHR's oncology flow sheets. For symptoms that may require a clinical intervention, a message is sent to the EHR message center. Interventions are auto documented in the EHR. ■

Report: Cynthia E. Keen



Mobile apps enable cancer patients to self-manage their physical condition and symptoms.

But these apps have not become commonplace just yet. Today, most cancer patients receiving chemotherapy and/or radiotherapy treatments rely on their phones to provide patient-reported outcome (PRO) data, calling a 24-hour cancer treatment centre hotline. When recording details on the patients' electronic health records (EHR), this data can enable symptom tracking and surveillance, increase quality and data management, and improve productivity and efficiency for healthcare providers.

Timely PROs can also help reduce healthcare costs. Clinical studies show that standardized adoption and routine use of PROs can improve early identification of patient symptoms and their severity and can trigger human and/or AI interventions. Cancer Care Ontario, an early pioneer, launched a PRO programme for ambulatory cancer patients in 2007. Patients receiving treatment between 2007 and 2015 who actively participated were 8% less likely to visit emergency departments and 14% less likely to be hospitalized, according to a

study published in JCO Oncology Practice.

UK cancer app analysis

The ability of mobile apps to integrate with EHRs is essential. Researchers at the Christie NHS Foundation Trust in Manchester, UK, conducted a study to determine how many cancer apps available for use in the United Kingdom that focused on systemic anti-cancer therapy (SACT) collected data for multiple types of cancer from adult patients and transmitted the data to a healthcare provider. The researchers excluded apps from their study if they were for a single type of cancer, diagnostic-specific, associated with a single cancer centre only, required a password-protected login with a healthcare provider, and/or unable to input data. Out of 405 apps identified by UK Apple App and Google Play, only 12 met the researchers' eligibility criteria. None interfaced to EHRs; today, several have connectivity to some EHRs. Lead author Amy Vercell and colleagues evaluated the purpose, functionality, and quality of the twelve apps. All of them enabled

age 45 symptoms listed by apps. Ten apps generated reminders. Only five provided general cancer and cancer treatment information. None had been tested in clinical feasibility trials. The top-rated apps were Careology, ChemoWave, Lifye, and Vinehealth. Writing in the International Journal of Medical Informatics, the researchers concluded, 'There does not appear to be a high-quality patient-facing app available for patients with any cancer type which enables electronic PRO measures (ePROMs) to be documented and analysed, with findings integrating into the patient's EHR.'

Prof. Philip Payne, PhD, the founding director of the Institute for Informatics at Washington University in St. Louis, US, tells European Hospital that 'the current state of mobile app development in the cancer domain is quite formative. There remains substantial opportunity to mature and improve such apps and both improve human-computer interaction as well as the quality and completeness of ensuing data.' He sug-

Here to stay? A look ahead

'The goals of integrating digital health tools like mobile health applications and cancer care is five-fold: to improve access, enhance patient and clinician experience, improve outcomes, enhance equitable care, and foster a more efficient care system,' comments Justin Bekelman, MD, director of the Penn Center for Cancer Care Innovation at the Abramson Cancer Center at Penn Medicine in Philadelphia, US. 'Going forward, we need innovation on how these tools are deployed and through what channels. Is text messaging best? Apps? Internet connected speakers? The basic telephone? Which is best, for whom and under what conditions? And on how care teams incorporate the data that ensues into their workflows in order to change the course of care meaningfully for patients? Digital health tools in cancer care are now here to stay.'

UK developer Careology launched its eponymous patient-focused app in 2019, after registering with the UK's Medicines and Healthcare products Regulatory Agency (MHRA) as a class I medical device, with all Careology's products UKCA marked. Careology Professional, a "virtual ward" technology, provides a real-time visual dashboard, enabling triage teams to monitor patient vital signs, SACT toxicities, and medication adherence. In 2022, the London-headquartered company announced a collaborative partnership with Guy's Cancer of Guy's and St. Thomas NHS Foundation Trust, to add features and streamlined functionality, such as collecting data through wearable devices.

Careology has announced plans to expand beyond EHR functionality to take care beyond a hospital's four walls. 'Individual hospitals utilize many different EHRs, and traditionally this has presented challenges regarding integration across healthcare systems,' explains Paul Landau,

CONTENTS

HEALTH IT	1-4
EH@ECR	5-11
LABORATORY/ PATHOLOGY	12-16
SURGERY/ENDOSCOPY	17-20



Webcams in neonatology offer clinical value

Baby on-screen 24/7

True or false: Webcams have only recently been introduced in neonatology and are a patient-side component of the Digital Health Portfolio. False! Already in 1989, Professor Dr Roland Wauer at Charité Berlin built his DIY system to transmit images from the neonatology ward.

Today, there is only one such commercial webcam system available in Europe despite the market being huge: in 2020, in Germany alone 60,682 babies were born prematurely. The technology is not only used in neonatology but also in paediatric ICUs and mother-child units. In addition, since the Covid-19 pandemic it is also monitoring ventilated patients.

How does BabyWatch work?

The specialized webcam allows parents to see their child on a smartphone, tablet or desktop around the clock and in real-time. Thus, digitalization can contribute significantly to the bonding process between child and parents, siblings or grandparents. This might sound counterintuitive since in this crucial phase physical proximity, heartbeat and the smell of the baby are the foundation of a tight bond. However, successful bonding is also possible when the baby's status upon delivery and immediately afterwards does not allow physical contact. Several factors can positively influence bonding at a later stage, e.g. stress-free and enjoyable observation of facial expressions, gestures or minute movements of baby. The webcam complements and strengthens bonding, explains Professor Dr Andreas Holzinger, medical director of the paediatric clinic at Diakoneo Klinikum, where in November 2021 twelve "baby TV" cameras were installed: 'Studies, for example those conducted by Professor Dr Hans Proquitté at the University of Jena, have shown that for the milk production it is important for the mother to see the baby.'

The system in clinical routine

The fairly small camera, which is mounted on a flexible arm above the incubator, transmits live images. Using a password-protected access parents can see their baby



in a livestream from anywhere – either mobile or from home. The data is transmitted with 256 bit SSL encryption; data storage complies with GDPR requirements regarding user and camera management during data transfer and is handled by the admin server in a German high-performance computer centre. Images are transmitted in real-time, albeit without sound from the ward – which is an important aspect in a clinical environment. During the day, the livestream is in colour, at night in black and white. The parents and relatives see the baby's head and upper body. A control light indicates to the nursing staff whether the camera is turned off or whether the parents are "babywatching".

Advantages and drawbacks

While in theory the baby TV idea sounded great, in reality 'it was not met with undivided enthusiasm', remembers Dr Holzinger and explains that 'there were concerns that the baby TV would introduce a form of control and that the staff would have to deal with an

increased number of phone calls from anxious parents. Moreover, would the livestream mean that parents don't come to the hospital anymore because they are sitting in front of their screens at home? These were all valid concerns. To address them, team members of different professions spent time at the clinic of my colleague Dr Matthias Henschen who had been working with BabyWatch for two years.' This cooperation indeed alleviated concerns and a majority of the team members were willing to try the webcam system. But staff concerns were not the only hurdle to overcome: considerable purchasing and follow-up costs were frowned upon as just another financial burden in the already cost-intensive paediatric department. In the end, purchasing and financing were secured through a fundraising drive initiated by the clinic and the support by the Friends of the Paediatric Clinic.

Premature births during the coronavirus pandemic

In the paediatric ICUs, specially trained nursing and medical staff care for the small patients 24/7 with immense dedication and expertise when a baby's birth happens much too early or when complications arise. In paediatric departments, complying with Corona rules has severe effects on the neonates, parents and siblings. Because of the pandemic, in many hospitals around the world physical contact between parents and their babies was limited in line with WHO recommendations. Michelle Wunderlich was thrown into this difficult situation: in November 2021, at the height of the fourth Covid-19 wave, the 37-year-old nurse gave birth to twins. After pre-eclampsia, Ella and Paul were born eight weeks early and were put into intensive care right away. "It was a horrible feeling," the mother says and adds "I

was worried sick about my children. In the first days after the Caesarean section I missed the babies in my belly – I felt incomplete." Hundreds of questions overwhelmed Michelle and the babies' father: how are our children in the incubator? Are they agitated? Are they sleeping or are they crying? Are they moving or calm? The camera made it possible for them to see their children and bond with them. The own fears, but also the grandparents' fears slowly subsided and indeed the difficult situation had created a new kind of bond between the members of the family. After a few days – and in full compliance with the strict corona rules – Michelle Wunderlich and her husband were allowed to visit Ella and Paul. The first physical contact was a moving moment for the young parents. The family live far away from the hospital, one of the grandmothers even lives in a different country. One of the babies' status stabilized faster than the other's and it could leave the hospital shortly before Christmas; the second one however had to stay for several more weeks.

Caring for neonates has many high points and many low points. BabyWatch allows parents like Michelle Wunderlich and her husband to share the worries and the joy with siblings and relatives. The broadcast images enable physical and psychological closeness. "Despite my daily visits in the paediatric clinic I was happy to see my baby on camera at home. It reduced the distance and I no longer had the feeling that I give one of the babies more of my love than to the other," Michelle Wunderlich sums up her feelings.

What does science say?

A study conducted by Professor Proquitté of University Hospital Jena, Germany, during his time at Charité Berlin highlighted the

psychological benefits of the BabyWatch system. Many parents, he said, feel guilty or even responsible for their baby's premature birth. "Baby TV" helps parents feel closer to their children. Moreover, in the study hospital staff reported that – unexpectedly – with the webcams the parents visit their babies more frequently since early streaming creates a bond with their children in the hospital which increases the desire for personal and close contact. In addition, the frequent livestream via the webcam alleviates the parents' fear that their children are not well. 'Some studies indicate that BabyWatch supports early bonding but there is no scientific evidence yet as to its effectiveness,' explains Professor Holzinger. A highly anticipated new study conducted by private docent Dr Nadine Scholten from the University of Cologne might offer new insights. Her team at the department of medicine sociology, care research and rehabilitation science has been researching the topic in cooperation with four hospitals. Results are expected in summer 2023. ■

Report: Manuela Giesel



Thanks to the Babycam, the Wunderlich family can always keep an eye on their second child in the clinic.



Manuela Giesel

Manuela Giesel is head of health communication and fundraising at Diakoneo KdöR.

Inks and polymers

3D printed pharmaceuticals for personalized therapies

60 percent of all administered drugs do not have the desired therapeutic effect. Even worse: in Germany alone about 60,000 deaths per year are caused by medication. With these shocking statistics Professor Dr Christian Franken started his presentation on "Pills from the 3D printer" at last year's Medica in Düsseldorf. He hopes that his vision of personalized medication based on 2D and 3D printed active ingredients can provide significant improvement.

correct point in time and with the correct dosage; moreover, it will improve efficacy and tolerance of pharmaceuticals and reduce medication errors. The printed pills are more expensive than the conventional pressed version since they

are available to pharmacies both inside and outside of hospitals; eleven further printers have been ordered in Europe and the US.

Reduction of garbage

Printed drugs have another significant advantage: blister packaging becomes obsolete. Franken explains that 'when we only produce the volumes that we really need, pharmaceutical garbage decreases. About half of all drugs produced never reach the patient. Today, it is not unusual for large pharmaceutical companies to manufacture batches of 15 million tablets in order to reduce the costs per piece.'

The founder of DiHeSys would like to see drug production move from big plants to pharmacies – much closer to the patient. This would not affect the pharmaceutical industry negatively, Franken underlines, since companies such as DiHeSys would partner with drug companies. He is optimistic that 'personalized medicine based on 2D and 3D printing will dramatically increase speed and flexibility, and thus also efficiency and efficacy in research and development – which will benefit drug companies.'

Report: Sonja Buske



© Ute Huber

'Nobody would ever think of prescribing all diabetes patients the identical dose of insulin. Rather, each patient receives their personalized dose that is administered at the correct point in time, for example via an insulin pump,' points out Professor Franken. With pills, however, this doesn't work since cutting them in two or at most four pieces rarely provides the exact required dose. 'This can lead to over- or underdosing, particularly with older patients who have to take several pills each day. Inadequate medication does not only cause side effects but contributes to patient non-

compliance which in Germany generates estimated costs of about 10 million euros each year.'

Producing exact doses based on patients parameters

Professor Franken, a pharmacist by training, is working on a solution: his company Digital Health Systems (DiHeSys) developed 2D and 3D printers for drugs. The systems can produce exact doses according to physicians' specifications based on the patient's gender, age, weight, blood and tumour values, intolerances and other parameters. This ensures that patients receive their medication at the

are made to order. Nevertheless, health insurers expect not only increased quality but also lower overall costs since superfluous visits to specialized physicians and unnecessary hospital stays can be avoided.

2D: ink with active ingredients

In 2D printing, the active ingredient is printed as a special ink on 8 cm² wafers which dissolve in the mouth within about 20 seconds. 'This is the ideal solution for children or older patients who have problems swallowing,' says Franken. Moreover, particularly in paediatrics many drugs are not available in the required dosage and the pharmacists have to make individual pills. Exact dosage however is important when the difference between the desired effect and toxicity is very small, Franken points out. Thus, he considers printed drugs particularly promising in neurology, cardiology and oncology.

3D: layered polymers

2D printing has certain limitations: the wafer can only take a maximum of 40 mg of an active ingredient and delayed release is not possible since the substance must come in fluid form. 3D printing offers an important alternative with several polymers carrying active ingredients being layered. Ideally, the patient only has to take one tablet per day which is tailored to their individual needs.

27 ingredients are currently being developed in ink or polymer form. Three printers have been made

Top 10 health technology hazards

ECRI's annual top ten technology hazard list alerts hospitals and healthcare providers of situations, products, and procedures they need to diligently monitor and/or take steps to improve.

No. 1 – Gaps in recalls for at-home medical devices

No. 2 – Defective single-use medical devices

No. 3 – Inappropriate use of automated dispensing medication cabinet overrides

No. 4 – Undetected venous needle dislodgement or access-bloodline separation during haemodialysis

No. 5 – Cybersecurity risks associated with cloud-based clinical systems

No. 6 – Inflatable pressure infusers (PIs) can be dangerous and cause embolisms

No. 7 – Confusing ventilator cleaning and disinfecting requirements

No. 8 – Electrosurgery units can cause serious burns

No. 9 – Cardiac telemetry monitoring should be limited to cardiac patients

No. 10 – Mandate reporting of all medical device-related issues

More details at:
www.healthcare-in-europe.com

CEK



© DiHeSys

rein medical
a JVCKENWOOD Company

Every operating theatre is different - and we are prepared for it. In addition to technically and hygienically high-quality wall-mounted consoles, operating theatre field monitors and all-in-one computers, we offer a scalable software suite that allows us to implement customized solutions for the medical IT sector.

Our team integrates research and development, production and sales, project planning and service under one roof.

With over 20 years of experience in the medical market, we stand for quality, innovation and reliable service.



reinmedical.com

New generation of wearables

Smart ring medical device for 24/7 blood pressure monitoring

A smart-ring medical device is emerging as an effective and discreet wearable for round-the-clock blood pressure monitoring. Using photoplethysmography (PPG) signals to measure the bloodstream 24/7 through the wearer's finger, a new feature of the "Cart-I plus" ring from manufacturer Sky Labs enables it to constantly monitor hypertension without user intervention.

The company's CEO Jack Lee discussed the role of smart rings for continuous blood pressure (BP) monitoring during the Medica Trade Fair in Düsseldorf, Germany. His presentation, "Measuring blood pressure all day long with a ring-type medical device and AI platform", highlighted how PPG signal-based BP estimation is a promising candidate for modern BP measurements.

While conventional ambulatory blood pressure monitoring equipment can take measurements at regular intervals for 24 hours, it is limited by patient discomfort in continuous use, such as waking up during sleep, or constrained measurement posture. Lee said: 'Hypertension may have no symptoms at all for months or

years, but then can cause heart attack, stroke, and vision and kidney damage. So, it is important to get blood pressure checked regularly; non-invasive and cuffless blood pressure measurement is a key technology to manage hypertension continuously and conveniently.'

Detection of "white coat" and "masked" hypertension

Using the Cart-I plus smart ring, he added, it is possible to measure active blood pressure for 24 hours, which helps reduce the risk of cardiovascular diseases through blood pressure variability and nocturnal hypertension monitoring. The device is also designed to detect both "white coat" hypertension (where office-based pressures are elevated and out-of-office pressures are normal), and "masked" hypertension, where these effects are reversed. 'In addition, 24-hour monitoring can help establish treatment strategies such as the type and dose of prescription drugs,' Lee said.

Sky Labs is currently running a clinical study on the use of the smart ring for continuous BP



© Sky Labs

monitoring, with results due to be published early next year. The Cart-I platform is already commercially available in Europe and the UK for monitoring heart rate and has proved effective in long-term monitoring for Atrial Fibrillation (AF), with accuracy of 96.9%. Lee explained: 'A characteristic of chronic diseases is that they often require a long period of supervision, observation, or care. The features of the Cart platform

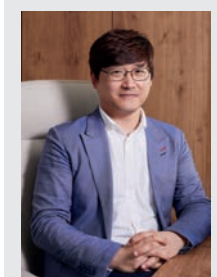
– including continuity and comprehensiveness – make it suitable for managing chronic conditions in daily life.'

Alongside AF monitoring, the smart ring can collect data for oxygen saturation (SpO₂), heart rate, and electrical activity (ECG). Autonomous cuffless blood pressure readings will be available in Korea early in 2023 and soon after in Europe and the US.

Patient empowerment

Data gathered by the ring's PPG sensor is transmitted to a cloud platform where AI technology can detect AF. It also uses ECG signals to provide additional information to the user's doctor, often without user intervention. 'The ring helps patients manage and track their health data continuously and automatically. It could be also valuable for people who live far from hospital or who are too busy to visit the hospital.'

With hypertension monitoring, Lee said there are further benefits for patients: 'Home blood pressure monitoring is empowering and improves our ability to identify and



Jack Lee

Jack Lee is CEO and Founder of Sky Labs, a South Korean-based medical device start-up and preventive healthcare company. Before he established Sky Labs in 2015, he was a researcher who developed 5G mobile telecommunications and advanced signal processing systems at Samsung electronics DMC research centre. Having developed Cart-I for continuous Atrial Fibrillation monitoring, the product is now being evolved for monitoring blood pressure and other vital human indicators.

treat hypertension, and to prevent strokes, heart attacks, heart failure and cardiovascular death. Thus, continuous monitoring regardless of time and place can help patients save time and money, and save their life by preventing diseases from occurring now and in the future.'

Report: Mark Nicholls

At-home diagnostics

Making remote patient monitoring simple



The portable medical device is worn on the chest.

Increasing accessibility of remote and home monitoring for patients with pulmonary diseases can help improve treatment and rehabilitation adherence, and support health systems and hospitals in tackling waiting lists. The various advantages of remote monitoring systems were highlighted in a session focusing on "Preventing chronic diseases with diagnostics and analytics" at Medica trade fair.

Among the speakers was Dr Łukasz Czekaj, CTO of medical device firm Aidmed, who examined the value of rehabilitation programs in the

remote/telemedical paradigm for pulmonary rehabilitation of people with COPD (chronic obstructive pulmonary disease) and post-Covid patients.

During the session "Simplifying patient monitoring and rehabilitation process for pulmonary chronic diseases, using IoT and machine learning", he outlined how relatively straightforward devices such as the Aidmed One recorder can be used for assessment of a patient's condition, breathing and aerobic exercises, and follow-up to assess progress.

The portable medical device, worn on the chest, incorporates a pulse

oximeter for measuring physiological parameters.

Respiratory rhythm

Data is collected on changes in chest volume, patient movement and position. There is a pressure sensor for airflow through the nose/mouth, a temperature to monitor skin temperature, and a SpO₂ sensor for pulse rate and oxygen saturation of the blood. An ECG signal is collected using a single-channel module through silicon electrodes placed on a chest strap. From recorded changes, respiratory rhythm can be determined and help highlight how the patient is progressing.

During the session, Czekaj detailed the device and the Aidmed mobile app for patient notification and interaction as well as discussed issues of patient adherence in the context of monitoring and motivation. The device and app also allow for integration with other devices, such as blood pressure monitors, pulse oximeters, or spirometers.

Ongoing challenges

Czekaj said ongoing challenges for pulmonary rehabilitation include hospital wait times and shortages of qualified medical personnel. But he suggests a program of home rehabilitation for COPD and post-Covid patients can deliver

remote quantification, monitoring and motivation, and also be a preventive measure. The patient monitoring via a simple-to-use wireless device with no cables, sees data transmitted to the cloud system and made immediately available for medical personnel.

'This leads to a reduced risk of failed examinations due to online signal quality,' he said: 'The benefits for data collection are that it reduces digital exclusion, and with data transmission to cloud there is high availability, with no missing data or the need to go to the doctor with a disk, or for examination repetition.' Benefits for patients include increasing availability of rehabilitation services and with the biofeedback facility, the processed data is immediately available. 'That can lead to improved patient adherence, long-term patient follow-up,

and increases the availability of rehabilitation services,' he added.

Czekaj acknowledges that patients at times neglect rehabilitation recommendations, but said that remote rehabilitation after diagnosis or a stay in a hospital helps improve the motivation to adhere to rehabilitation plans. 'We increase availability and reduce the cost of diagnostics and provide a real alternative to interventional methods and stationary rehabilitation,' he said. 'Our goal is to make an impact on public health through the introduction of effective pro-health rehabilitation on a large scale and achieve this through home/remote rehabilitation, gamification and effective patient motivation.'

Report: Mark Nicholls



© Aidmed

EUROPEAN HOSPITAL @ ECR 2023

Interview with President Adrian Brady

ECR 2023: Going back to normal – with a few twists

ECR 2023 will return to its traditional date in March, but delegates can expect novelties with sessions touching not just cutting-edge science, but also archaeology and palaeontology, and putting trainees in the spotlight, Congress President Professor Adrian Brady told European Hospital in an exclusive interview.

EH: How will this year's congress be different from previous iterations?

Prof. Brady: 'I'd like to put the attention on the next generation of radiologists in the InFocus programme, because the world they'll be working in will be quite different to the world we know. We'll discuss how to keep pace with a rapidly accelerating workload, deal with the potential for burnout, and ensure equity, inclusivity and diversity in the workforce.'

'Speakers will also tackle practical issues such as how to report. We're putting together some instructive sessions and will be circulating cases ahead of the meeting so that trainees can submit their reports to have them discussed at ECR, in order to improve their reporting skills.'

We'll keep our informal Open Forum, where delegates can interact casually, and the AI Theatre, where companies present their own algorithms. We'll introduce some challenge elements to the format.'

The ECR's theme will be "the Cycle of Life". Can you explain?

'As an amateur cyclist, I wanted a bicycle in the poster. So now we have this beautiful road bike, which is actually the specific one I use. I wanted to integrate that into something meaningful. The entire congress theme is based on the fact that radiology is intrinsic to healthcare throughout life – from the moment of conception to the moment life ends and even before and after that.'

'We showcased what radiology contributes to healthcare. So, we have labelled sessions with the name tag "Cycle of Life", on imaging at different stages of life: prenatal, infancy, paediatric, young adults, healthy middle-aged individuals, older patients and end-of-life. We will also have sessions on post-mortem and forensic radiology, and on the use of radiology beyond the medical field – for example in archaeology and palaeontology. For example, imaging can be used to verify the veracity of art works or the integrity of antique musical instruments. These interesting topics will add something different to the congress.'

Why did you choose to return the ECR to early March?

'Last year we held ECR in July because Covid was still raging and strict travel restrictions were in place when we were planning for the meeting. ECR 2022 was a huge success, but the attendance was not what it usually would have been in March before Covid. Many of our members remarked that July was not a good time, since many are either on holidays or working very hard to make up for absent colleagues. Our industry partners also said they needed radiologists to be present for industry's participation to be relevant.'

'So, we had a lot of discussions among the board, and listened to the feedback and decided to revert

to March. The response had been overwhelmingly positive. Hopefully we'll have huge attendance and revert to the normal schedule.'

Is that what you want to see as president: a return to normal?

'I want things to get back to normal. You don't have to break up existing structures if you come into an organization that works very well. I've been very lucky to serve under predecessors who have been imaginative and incisive in terms of what they envisioned for the congress. I'm not trying to change anything massive. We're always adapting to new things. The last couple of years have been heavily shaped by the pandemic and a lot of work has been done to return to a normal situation.'

Will the industry have an increased presence in the venue again?

'Last year, we integrated the industry into the academic site, closer to the scientific sessions. We received positive feedback from both our attendees and commercial partners, so we will repeat it this time.'

What will be the "ESR Meets" countries?

'My home country Ireland should bring a strong community of radiologists and radiographers. Canada, a country I've worked in for a number of years and have a strong affiliation with, will be our second guest. We're also eager to welcome Romania, the single biggest consumer of educational activities from the European School of Radiology.'



Adrian Brady

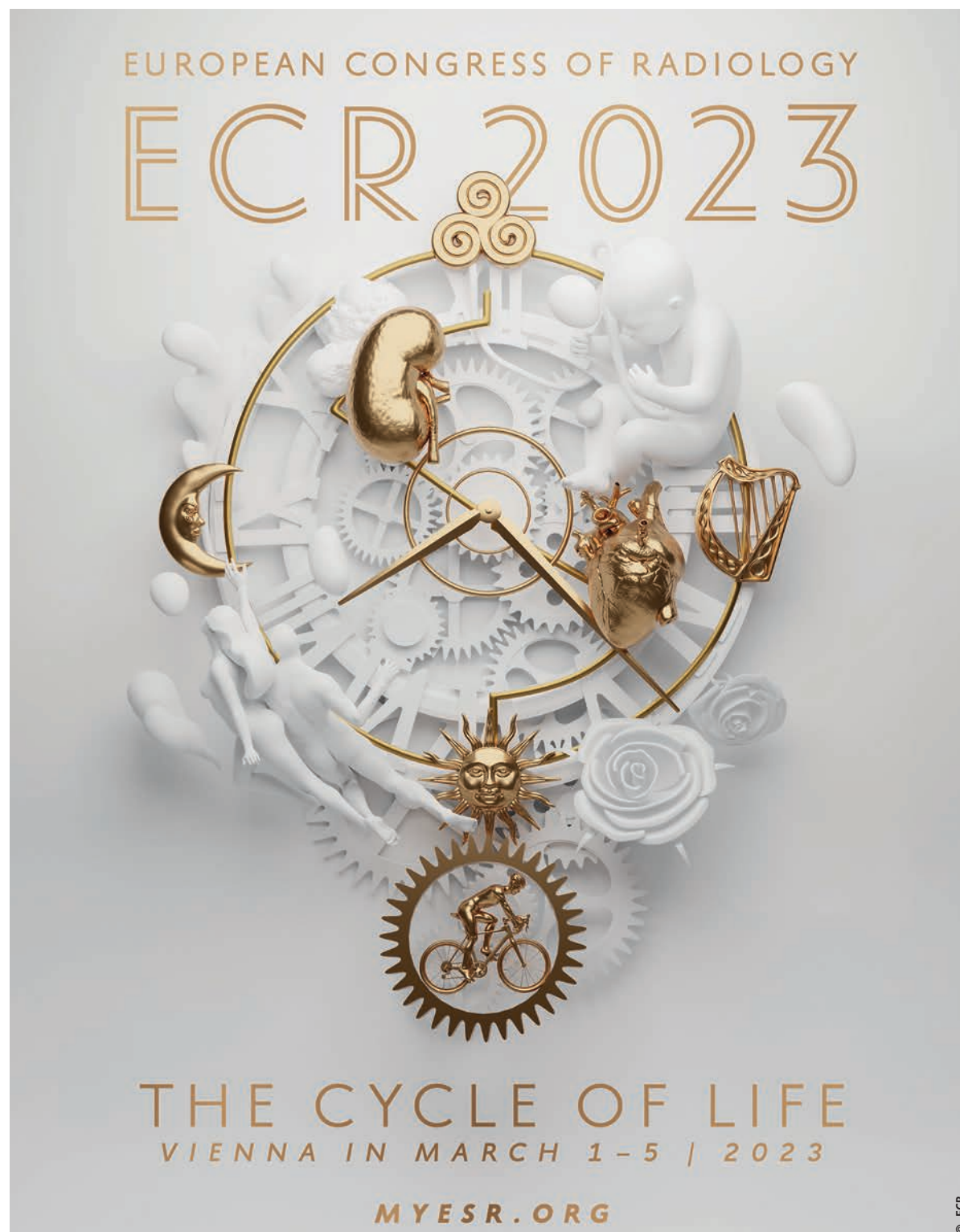
Professor Adrian Brady has been a Consultant Radiologist in Cork since 1995, having previously trained in Dublin and Canada. His principal practice interests include interventional and abdominal radiology. He is Medical Director of the Irish Hereditary Haemorrhagic Telangiectasia (HHT) National Centre (based at the Mercy University Hospital). Prof Brady was Chair of the European Society of Radiology (ESR) Quality, Safety & Standards (QSS) Committee from 2017 to 2020, with responsibilities covering areas of patient safety, radiation protection, audit, standards, eHealth & informatics, clinical decision support and other areas. He is currently President of the ESR.

As the former Chair of the European Society of Radiology (ESR) Quality, Safety & Standards (QSS) Committee, what do you think are the challenges in these areas?

'AI is probably the single biggest change to have come into our working lives for the past 20 years. We will continue to expand our educational offerings in radiology AI, with master classes that will go live in the coming months. There are numerous EU projects underway in radiation protection and safety. Furthermore, we are expecting the results of a study led by Professor Boris Brkljačić from Croatia that is looking at justification of CT scans in seven EU countries, to ensure people understand the need to justify these examinations.'

'Clinical decision support is another big area. The ESR iGuide is continually updated and made available to referrers. Patient safety is very important too, and the QuADRANT project, which we started in January 2020 together with the European Association of Nuclear Medicine (EANM) and the European Society for Radiotherapy and Oncology (ESTRO), will help the European Commission publish recommendations based on clinical audit.'

'The ESR's Patient Advisory Group for Medical Imaging (PAG), now led by Caroline Justich, is also very active.'



© ECR

Interventional toolkit for use in space travel

Radiologists shoot for the stars, aim for the earth

French radiologists received prizes for the best interventional radiology toolkit for use in space travel at the JFR 2022, the annual meeting of the French Society of Radiology (SFR).

The teams from Marseille and Créteil received the awards for their solutions to carry out interventions in manned space flights, as part of the Mars IR Tool Box Challenge, an initiative led by the SFR and the National Centre for Space Studies (CNES, in French: Centre national d'études spatiales). 'A lot of work has been done here,' said Vincent Vidal, a professor of interventional radiology at Aix-Marseille University and a radiologist at Assistance Publique – Hôpitaux de Marseille (AP-HM), who coordinates the project. 'One of the interns in the competition has even done his medical thesis on the embedded space kit.'

Though unique in their approach – one of the teams even simulated an alien attack –, participants all presented boxes featuring versatile, small and light material to perform different kinds of drainage in space: needles, catheters and drains to drain a kidney with renal colic, urinary retention or a deep abscess. 'Those would be the most typical interventions that could be carried out in space – biliary drainage, vesicle puncture, etc,' Vidal

said. Performing interventions in a gravity free environment is a challenge that teams had to think of at the time of designing their toolkits. 'Everything takes another very specific dimension,' he said. 'Objects float in space flights, so they have to be attached. Adding a suction system to collect the fluids when puncturing an abscess also makes sense.'

Teams will now continue to work together to create an optimal toolbox and test it in microgravity, Vidal explained. 'We've never done an intervention such as drainage in space. We have two solutions to test it on simulators: Zero-G flights – parabolic flights – or underwater



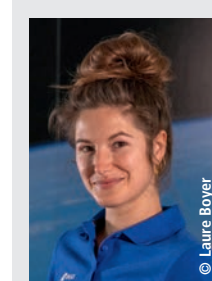
One of the toolboxes presented for the Mars IR toolbox Challenge.

in a pool.' The next step will be to distribute the box and find an industrial partner to embed the kit on a mission to the Moon or Mars. 'Our toolkit may be taken on space flights, or it may just be a small link in the chain to one day take an interventional radiology kit into space,' he said.

Another use for the box may well be on Earth, for example in the Sahel or West Africa. 'This box will be able to serve in so-called specific environments where there are only scarce resources,' said Vidal, who is also active in Fair Embo, an association to help emerging countries use interventional radiology.

Tools with a terrestrial fallout

Many of the innovations developed for health in space can be translated back to Earth, according to Laure Boyer, a biomedical engineer at the Institute for Space Medicine and Physiology, who also took part in the project. 'In space, the human body ages at an accelerated pace, so many things we develop for astronauts can also be used down here,' she said. 'Spaceflight is an interesting setting to create solutions for the aging bone. Astronauts develop osteoporosis just like women on Earth as they age, or people with a too sedentary lifestyle or who are bedridden because of an injury.' The efforts for the space programme might also produce solu-

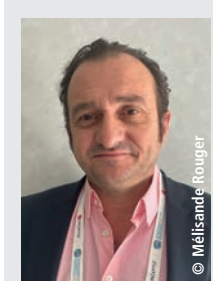


Laure Boyer

Laure Boyer is a biomedical engineer at MEDES, the Institute for Space Medicine and Physiology in Toulouse, France. She is responsible for the development of innovation projects for astronauts' health and performance on future Lunar and Martian bases. Boyer graduated from the Superior Institute of Aeronautics and Space (ISAE – Toulouse) in 2012, and received her PhD in biomechanics from the Polytechnic School of Montreal in Canada in 2017.

tions for muscle problems, such as muscle atrophy, she added. 'All the developments that are done for the International Space Station (ISS) or another space station have direct terrestrial fallout.'

For example, tele-ultrasound technology was first developed in space. Space stations are traditionally equipped with an ultrasound probe, but astronauts may not have the necessary skills to operate it. Thus, experts have developed a tele-operated ultrasound device, in which the probe in space has a



Vincent Vidal

Vincent Vidal is the head of interventional radiology in the Imaging Department at Timone University Hospital in Marseille, professor at the faculty of medicine and director of the Experimental Interventional Imaging Laboratory at the Aix-Marseille University in France. Vidal's research and clinical work are focused on embolisation and he is an active member of multiple interventional radiology societies (SIR, CIRSE, ESR, APSCVIR).

"twin" on earth – both devices are connected by satellite connectivity. When the sonographer on Earth watches what is happening in the ISS on video, he or she can manipulate the ISS probe remotely from the ground. 'Tele-ultrasound was developed for the ISS, but the terrestrial impact is direct. In places where we don't have an ultrasound expert on-site, for example in sparsely populated areas, tele-ultrasound can still make quality images at a distance,' she concluded. ■

Report: Mélanie Rouger

Sponsored · Optimization for CT

An update for contrast agent injection

The Accutron CT-D Vision is the next generation of the leading contrast agent injector for computed tomography from Medtron AG. Focusing on the needs of the user, the latest development stage of the Accutron CT-D improves the usability of the CT double-piston contrast agent injector and optimizes its integration into the radiological environment.

With a RIS/PACS interface based on the DICOM standard, the IDS

Software Option provides direct access to the worklist from the RIS (Radiology Information System), allowing users to assign the contrast injection with the associated patient images and data and store them in the PACS (image archive). In addition, more data can now be tracked for optimal patient care with the Accutron CT-D Vision: By recording the puncture site on the patient, the size of the injection catheter, and the contrast agent type as part of the injection data, the Accutron CT-D Vision provides

comprehensive traceability and documentation of contrast agent administration.

Modern user interface

The graphically redesigned user interface of the Accutron CT-D Vision supports easier use of the injector. It provides a comprehensive view of all parameters and visually highlights the most important ones. Selection from lists and a stored profile library simplify management. This makes upcoming examinations easier, clearer and more precise to program in a short time.

With high-resolution touchscreens of 10" on the injection unit and 12" on the remote control, user comfort has been improved. In addition to better readability, eye fatigue is also reduced. X-ray assistants and radiologists usually work at screens all day. With the Accutron CT-D Vision, they can choose between bright and dark light modes in the examination or control room to focus their concentration on the imaging process.

The new medical casters provide more flexibility in a radiol-

ogy environment with multiple exam rooms. The new "Valia" ceiling pendant from Ondal Medical Systems GmbH also makes the ceiling-mounted version more mobile, allowing for unrestricted 360° rotation.

Approved for contrast-enhanced mammography

Medtron AG has approved its contrast injector for CT, the Accutron CT-D, as the first and so far only dual-piston injector for contrast-enhanced mammography (CEM). The use of Medtron's Accutron CT-D injector as part of the CEM imaging procedures ensures a continuous and accurate flow of contrast agent. With machine contrast injection, uniform contrast enhancement of tumor tissue is supported. The contrast bolus is accurately administered with the aid of the Accutron CT-D, which enhances the quality of the imaging. The ability to rinse with saline solution creates a compact contrast bolus.

Post-flushing further spares the patient's veins by shortening the time that the contrast agent remains in the arm veins at high concentrations, which eventually



© Medtron

lead to irritations of the vein wall. This improves patient safety. The Accutron CT-D supports radiographers in an efficient workflow because the injection is automatic. As a result, radiographers have more time for the patient. ■

More than just MRI accessories



The role of the radiographer

AI in radiation protection: a potential game changer

Radiographers could help design new artificial intelligence (AI) tools for radiation protection, Mark McEntee, professor of diagnostic radiography at University College Cork, Ireland, argued during the annual meeting of the European Society of Medical Imaging Informatics (EuSoMII) in October.

'There are a lot of papers on AI, but not in the area of radiation protection and AI,' he told delegates in Valencia, Spain. 'AI in radiation protection is in its infancy, but it could be a game changer.' The expert identified three pillars of AI in radiation protection: justification of x-ray examinations; optimization of the examinations; and dose limitation. McEntee encouraged AI companies to aim for the low hanging fruits in those three areas. For example, justification is virtually untouched, he said: 'You could prevent unjustified examinations

by impeding those that are unnecessary. You might be surprised, but it happens a lot. Sometimes mistakes are made or, because results aren't available yet, doctors refer the patients again. The cumulative effect of dose to patient is something physicians should be worried about and it's a target for AI.'

AI could also help clinicians identify the correct examination to carry out. Some clinical decision-making tools already exist, but there is room for more, McEntee believes. Guidelines such as the American appropriateness criteria, the ESR iGuide or recommendations issued by the RANZC can help AI developers, but they are static resources that are not based on evidence, he explained. 'Information on justification is often based on the consensus of experts rather than well-designed controlled trials.'

Another challenge is patient consent. 'Many times, patients don't understand that there's radiation involved,' the expert pointed out. In some cases, medical experts face difficulties in explaining the procedures. 'Consent of patients is lacking, so decision support tools and potential radiology products could help here as well,' he said. Verifying the quality of data relies on humans, so it is expensive and challenging. AI companies should think of radiographers as a translation between the request of the doctor and the actual needs. 'Consider, when you design your products, that you have radiographers in the loop, and if you make them part of your workflow, they can do things like labelling examinations and artifacts,' he said. 'Give us the tools to label these things and we will.'

Design along the clinical question to further reduce dose

Once the examination has been justified it must be optimised. That's also an area where radiographers can help, McEntee continued. 'Optimisation is a shared responsibility, but at the patient's side it's done by radiographers.' Vulnerable patients who return on multiple occasions to the hos-

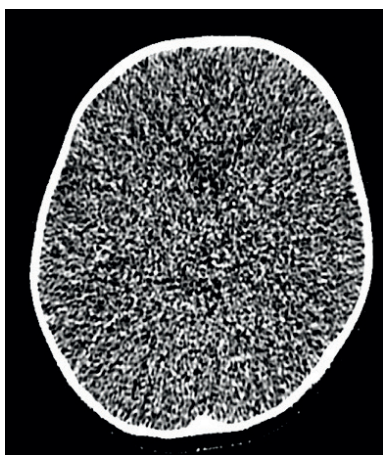
pital – for example patients with chronic disease – need lifelong imaging. This is 'an opportunity to learn from the previous imaging and look at things in ways we can enhance current imaging sets based on previous imaging sets. We can reduce the dose and learn from patients,' said the expert, who presented the case of a paediatric patient with cranial steatosis to illustrate this point. 'The problem was in the shape of the head': Because the fontanelle didn't open as it should have, the only area relevant for imaging was these bony windows. 'But in this case, the entire brain was scanned – this wasn't essential. They used 80% more dose than what was necessary,' he said. The clinical question should drive the protocol, he insisted. 'How decisions are made regarding the appropriate protocols for justification is a really important step.'

AI-automated 3D cameras

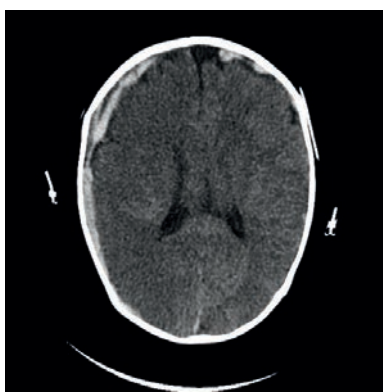
Another way to help reduce dose would be for radiographers to borrow radiology equipment such as AI-automated 3D cameras to better position the patient in radiation therapy. 'We already have good tools on automatic exposure control and we're increasingly using AI. (...) That would be a major way in which we can reduce dose.'

Adjusting dose to a patient is complex, he went on, taking the example of breast screening. 'There is no average breast. The average is based on an estimate by the physician that 50% of the glandular tissue of the breast is normal and 50 isn't,' he explained. 'We want to use AI to measure the density of this breast. It does far better with far less radiation. If you used that classification of breast density to replace the mean average, then you would actually calculate the appropriate dose required for a woman.' Radiologists and radiographers can feed in an algorithm as they go along the workflow. 'If we build the infrastructure of AI so that it's collecting data of users as we go along, we'd have potential benefits for patients and healthcare systems, including shorter waiting times, fewer unnecessary examinations, quicker diagnosis, and reduced instances about missed diseases because radiologists aren't overwhelmed looking at thousands of images,' he concluded. ■

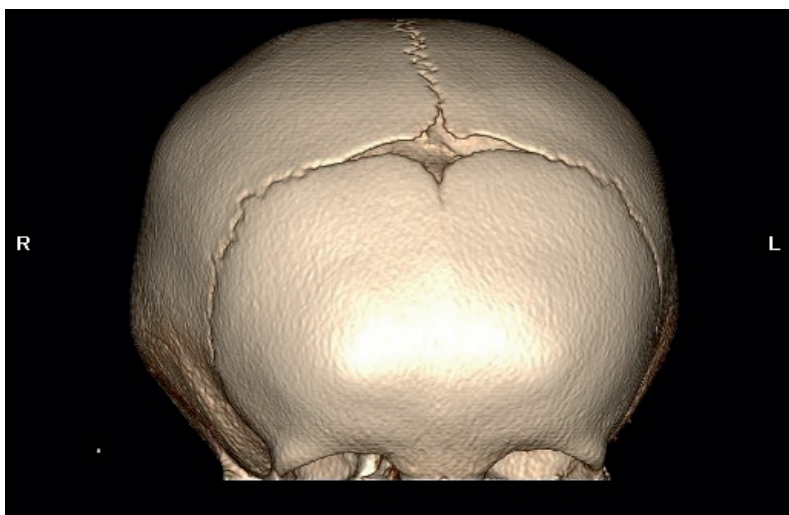
Report: Mélisande Rouger



CT scan of the brain at normal dose



CT scan of the brain at 80% less dose



Reconstruction of the skull from the 80% reduced CT scan, demonstrating its clinical utility and suitability for the assessment of closure of fissures

Advertisement

febromed



Comfortable and secure: The swivelling handle system helps patients to position themselves on the examination table with as little assistance as possible – even when transferring from a wheelchair.

Febromed provides support for everyday radiology work
Safe and hygienic: 'Get up'®

Whether in magnetic resonance imaging (MRI), computed tomography (CT), diagnostic radiology, or radiation therapy: in radiology, it's all about the details. Highly specialised equipment in a professional environment helps to make exact diagnoses and implement precise therapies. Everything else needs to be just as professional.

We at Febromed can help with daily operations with the 'Get up'® handle system. With our handle system, patients can perfectly position themselves on the examination table at their own pace. This takes the pressure off of medical personnel, letting them concentrate on what's essential: the examination.

Reducing workload

In radiology, a large section of patients have restricted mobility, something that can often present a considerable strain for medical staff. They have to use their full physical strength to move patients – and are in danger of becoming a medical emergency themselves. But besides the

physical complaints, there are also costs for the employer and the social system. 'Get up'® by Febromed helps reduce this strain in day-to-day work to a minimum.

Safety isn't just a handling issue; everything has also been carefully considered in terms of hygiene. The 'Get up'® handle system by Febromed is easy to disinfect and meets the highest hygienic requirements of a medical environment. The material is extremely durable, an investment in safety, but also in cost efficiency.



The 'Get up'® handle system can not only be mounted on the ceiling, but also on the wall.
Photos: Febromed

febromed

www.febromed.de



Febromed GmbH & Co.KG
Am Landhagen 52 | D-59302 Oelde

Telephone ☎ 0049 2522 92019 20
Telefax 📠 0049 2522 92019 19
E-Mail ✉ vertrieb@febromed.de

Sponsored • Boehringer Ingelheim relies on Rein Medical for monitors and digital door signs

Safety guaranteed, requirements fulfilled

Pharmaceutical research companies impose very high security standards on themselves for good reasons, as they are potential victims of cyberattacks and espionage attempts. This is no different at Boehringer Ingelheim. Its systems must be particularly secure, which means they need to meet high standards. The company checks this regularly. One way to ensure this is to separate the systems from the office network. Each monitor is assigned a separate port, which is checked via IT security. This has helped the biopharmaceutical company successfully stand their ground against any attacks so far.

Mönchengladbach-based IT service provider Rein Medical has been supplying these monitors since 2019. The company and its solutions also underwent a security check prior to installation. Boehringer Ingelheim relies on eight Operion monitors with a 24" display size and two monitors with a 55" display size in its laboratories and work areas.

The monitors are exclusively used to display information. With the 24" displays, the employees also have access to the Manufacturing Management Software (MMS), i.e., the holistic software for automatic production planning and control. They can use it to centrally enter data, and to operate and control workstations and systems.

In the selection process, Boehringer Ingelheim's managers looked at a whole range of monitors from different manufacturers and assessed them based on pre-defined criteria. In the end, they chose Rein Medical because the company provides a broad product portfolio covering many different sizes. Their monitors also fulfil other essential requirements: They can be treated with commercially available cleaning agents, have a retractable keyboard and meet all fire protection requirements as well as other specifications of the pharmaceutical company.

After the choice of system, the introduction of the monitors went

equally smooth. The displays run efficiently. Since the terminals are connected to the room information system via a terminal server, there is only one point that needs to be maintained. The electronic door signs also perform reliably.



Knowing from the outside what's going on inside

This holds true for the 40 door signs that Boehringer Ingelheim has been using since April 2021. 'Employees of the customer saw the digital door signs during a meeting at our headquarters in Mönchengladbach and were immediately interested,'

recalls Dirk Lambertz, the sales representative responsible for the project at Rein Medical. 'They were particularly taken with the LED status display, which is quite unique in this form.' Another feature that won them over was the possibility of adding individual content to the door signs.

At that time, Boehringer Ingelheim needed a digital display to provide employees with key information about rooms and equipment on site. The display also had to meet the high requirements for peripheral devices within the production rooms. After their cleanroom suitability had been successfully tested, the Doorsign displays were easily integrated into the IT infrastructure. The high flexibility of the electronic door labels was helpful in this process.

Thomas Jahn, automation engineer at Boehringer Ingelheim, regards the integrated LED frame as a particular highlight of the door signs, as well as the possibility of control via both hardware contacts and

software. 'These control options are central to GxP alarms for critical products,' he explains.

The data displayed comes directly from the company's internal building and room information system and is shown on the Doorsign displays. This gives the employees a better overview of what is happening in the laboratories and production rooms. The Doorsign solution was easily integrated into Boehringer Ingelheim's existing IT infrastructure and offers tremendous added value by making processes transparent.

A very satisfied client

Thomas Jahn regards the cooperation with Rein Medical as positive: 'The introduction of all components went smoothly. When problems did occur, we always received help quickly. We've also always been able to make an appointment quickly with the support team.' ■

www.reinmedical.com

Liver disease assessment

AI may give CT the edge over MRI

To assess diffuse liver disease, MRI is currently the modality of choice. New developments in artificial intelligence (AI) could tip the scales in favour of CT imaging. At ECR 2022 in July, experts showed how AI technology enables CT to quantify liver fat as exquisitely as MRI.

Global fatty liver disease prevalence has reached an all-time high, with non-alcoholic fatty liver disease (NAFLD) affecting up to 25 to 30% of the population in the United States and Europe, according to recent studies. This calls for a necessary conversation between physicians, according to Prof. Peter Galle, Director of the Internal Medicine Department at the Johannes Gutenberg-Universität Mainz in Germany. 'The sheer numbers force us to talk about fatty liver,' he said as he opened the session. 'Fatty liver increases the chance of developing

more serious diseases like fibrosis or hepatocellular cancer.' One of the main issues for medical teams is that supportive biomarkers to prove the presence of fatty liver currently do not exist. The diagnostic process becomes a game of excluding every other underlying disease in every single case, which triggers the risk of overlooking patients, Galle explained. 'Hepatitis C is commonly associated with fatty liver, and if you haven't had to screen the disease in a patient with fatty liver before, you might overlook it,' he said.

Detecting hepatocellular cancer (HCC) early on is another problem for hepatologists. 'We never really got into that in times where hepatitis B and C were prevalent,' he explained. 'We were lucky then, because these were relatively small groups of patients with a very high risk of developing HCC. With fatty liver, it's the very opposite; we

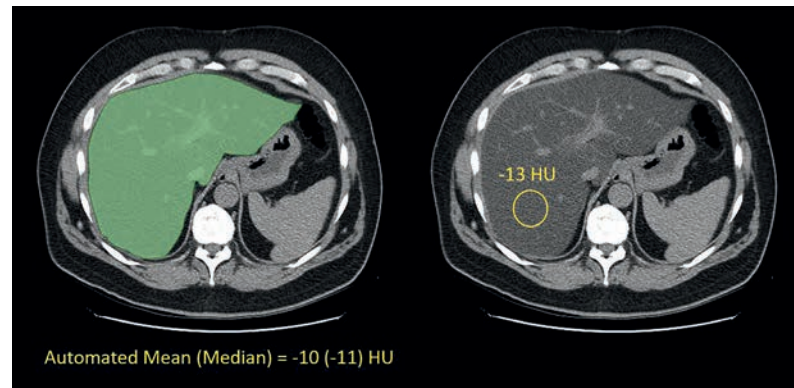
have a very large group and only moderate increase in HCC incidence. Screening and surveillance is even more of a problem.'

Assessing diffuse liver disease with AI-boosted CT

MRI has traditionally brought great results in quantifying hepatic fat, iron, and fibrosis – which are all key measurements to assess diffuse liver disease. But with the recent introduction of AI tools in CT imaging, radiologists are now exploring whether this modality could provide similar results much faster. 'It's worth investigating because CT is done at such a high volume and we can also automate these measurements,' said Perry Pickhardt, chief of gastrointestinal imaging at the University of Wisconsin in the US. 'This option can also feed into an MR surveillance scheme with initial detection by CT.'

Pickhardt and his team have looked at hepatic steatosis with both CT and MR, comparing the performance of both modalities. 'We used unenhanced CT, which is more useful and effective at actual quantification of liver fat than enhanced scanning, and a phantom that was both MR and CT compatible and contained different levels of fat covering the entire spectrum from 0 to 100%,' he explained.

The researchers found that there was a very nice linear correlation between Magnetic Resonance Imaging Proton Density Fat Fraction (MRI-PDFF) and unenhanced CT. 'That means we can convert from one to the other – i.e. start with



Images show automated and manual methods for measuring liver attenuation at non-enhanced CT in an asymptomatic 60-year-old man. Transverse (axial) CT image showing schematic depiction of automated (left) and manual (right) techniques. Automatically segmented liver is in green and manual region-of-interest (ROI) placement is in yellow. Automated Hounsfield units are based on volumetric segmentation of entire imaged liver, whereas manual Hounsfield units are based on areal mean within single ROI. Nonetheless, two values match well. Reprinted with permission from Graffy PM, Sandfort V, Summers RM, Pickhardt PJ. Automated liver fat quantification at unenhanced abdominal CT for population-based steatosis assessment. *Radiology* 2019; <https://doi.org/10.1148/radiol.2019190512>

CT and derive the equivalent MRI-PDFF value. Clinically, we can do things on the fly,' he said, adding that the results also apply to fibrosis assessment. Another study conducted in 400 healthy volunteers in Beijing showed a similar correlation between CT and MR.

Radiologists can often tell if mild steatosis is present on ultrasound, but quantification remains difficult. 'There are emerging techniques in ultrasound, but they're not at the level of what is done with CT or MR today,' he said. Prevalence of hepatic steatosis is rising, and based on ultrasound, estimated to be between 20-30% depending on the population. 'With CT measures and presumably MR in the same population, we find that about half the population qualify for at least mild steatosis,' Pickhardt said. 'But more

importantly, we'd get about 10% qualifying for moderate or severe steatosis, which is becoming the main target.'

Incidental steatosis can be non-invasively detected and quantified with either CT or MR. AI-boosted CT could be very useful in predicting survival as well. Looking at a five-year curve, patients' BMI provided no prognostic value, whereas liver fat qualification gave further insights in terms of predicting death. 'Liver and visceral fat does matter and non-contrast CT is quite good at showing these things. Since the number of CT scans is so great, we can actually do population-based opportunistic screening,' he said. ■

Report: Mélanie Rouger

Advertisement



Mammography supplement

Breast MRI screening for women with high-risk lesions – is it necessary?

Women with high-risk breast lesions (HRLs) and no family history of breast cancer or BRCA mutations are generally considered to be at moderate risk of developing breast cancer. Breast cancer screening guidelines suggest breast MRI be considered as a supplement to mammography. But is this expensive exam necessary?

Results of a 700-patient study of women with high-risk breast lesions published in the *Annals of Surgical Oncology* revealed that screening with breast MRI did not improve breast cancer detection compared to mammography. This is an important finding because there is limited data about this subgroup of women and could save substantial costs associated with unnecessary breast MRI exams.

The study analysed 540 patients who received mammography alone and 159 patients who received both mammography and breast MRI. The four-year breast cancer detection rate was 3.6% for both groups. Among the five cancers in the mammography plus breast MRI group, two were detected via MRI, two were only detected by mammography, and one was detected on clinical exam. However, the breast biopsy rates were significantly higher with the group that had mammography plus breast MRI, at 30.5% compared to those who only had mammography, at 12.6%.

Doubtful about benefits

Researchers at Brigham and Women's Hospital and the Dana-Farber Cancer Center in Boston conducted the study because patients with high-risk lesions (HRLs) of the breast were under-represented in the historical screening MRI trials that demonstrated improved cancer detection with MRI in high-risk populations. Lead author Alison Laws, MD, a breast surgeon at Brigham and Women's Hospital, told European Hospital that 'patients with HRLs are unique in that their future breast cancer risk is only moderately elevated and they typically go on to develop ER-positive breast cancer. Thus, it is unknown whether MRI screening has benefit in this group. Given that we use screening MRI selectively for patients with HRLs in our clinic, our cohort provided an opportunity to compare outcomes in those receiving screening mammogram alone versus in combination with screening MRI.'

Considering the database

Patients in the study had atypical ductal hyperplasia (ADH), atypical lobular hyperplasia (ALH), and/or lobular carcinoma in situ (LCIS), all of which are considered to be HRLs of the breast. The database for these women included age, race, Ashkenazi Jewish ancestry, body mass index (BMI), menopausal



Breast cancer screening guidelines suggest breast MRI as a supplement to mammography. But is this really necessary?

status, mammographic breast density, family history of breast cancer in first- or second-degree relatives, and type of HRL captured from the baseline evaluation.

The primary outcomes of the study were rate of the ductal carcinoma in situ (DCIS) or invasive breast cancer detection and rate of breast biopsy during follow-up visits. The researchers also evaluated characteristics of the detected breast cancers, including means of detec-

tion, tumour features, and treatment details. Invasive breast cancer or DCIS was detected in eight patients receiving mammography alone and five patients receiving mammography plus breast MRI. Only two of the five cancers detected in the mammography plus breast MRI group were detected exclusively by breast MRI, providing further evidence that the incremental yield of breast MRI screening is likely low.

Breast density as a redeeming factor for MRI

At Brigham and Women's high-risk breast clinic, screening breast MRI was used selectively for about 25% of the patients. Breast MRI was used more often for younger patients and those with extremely dense breasts or a strong family history of breast cancer.

'In addition to the fact that rates of breast cancer detection were no higher with the use of screening breast MRI than with mammo-

graphy alone, all detected cancers were early stage with favourable prognosis.'

Further, use of screening MRI comes at a cost of more than double the rate of breast biopsies compared to mammography alone,' said Laws. Principal investigator Tari A. King, MD, and colleagues write: 'Selective MRI used for patients with extremely dense breast is likely appropriate due to reduced sensitivity of mammography in the setting and lower interval cancer rates observed with supplemental MRI then with mammography alone. However, we found a lack of improved cancer detection and a high uninformative biopsy rate with short term screening MRI use.'

Uncertainty to the benefit of screening MRI

'These early findings lend uncertainty to the benefit of screening MRI for patients with HRL. However, most HRL patients should be considered to have moderately elevated breast cancer risk and management efforts should focus on adherence to conventional screening breast imaging with annual mammography as well as strong consideration or use of chemo prevention.'

Report: Cynthia E. Keen

New NEWTOM 7G

WIDE.VISION

www.newtom.it



NEW IMAGING HORIZONS.

Featuring a large gantry aperture, the NewTom 7G is the most advanced CBCT device on the market. From in-depth detail to the big picture.

ULTRA-DETAILED MULTI-DIAGNOSTICS Localised analysis over the entire body. Ray2D and 3D imaging up to 90 µm, also with radiocontrast agent. Artifact reduction and movement analysis using CineX and Cine-Scout. The eXtra Functions protocol extends the field of view longitudinally to analyse anatomical structures such as the spine and limbs.

TECHNOLOGICAL EXCELLENCE High power generator (120 kV – 20kW). High-sensitivity 3D panel and innovative algorithms for volumetric reconstruction. 77 cm gantry aperture.

ERGONOMICS AND PRACTICALITY Fully motor-powered table and 10" touch-screens, front and rear. Optimised examination flow thanks to certified NNT software with processing, sharing and RIS/PACS connectivity functions.

MAXIMISING PATIENT CARE The patient lies comfortably on the table and X-ray doses are always proportioned to the patient's build and the examination type thanks to SafeBeam™ technology.



Stepping outside of healthcare to help the planet

Radiologists as champions for health equity

Climate change will impact health and complicate access to care for the most vulnerable, but radiologists can do more than just sticking to their jobs. They should step outside the confines of their specialty and promote health and wellbeing in their communities, an eminent American radiologist explained at the annual meeting of the Radiological Society of North America (RSNA).

The responsibility of today's radiology professionals is to create the best experience for patients, the community and beyond, Professor Reed A. Omary, Chair of the Department of Radiology at Vanderbilt University Medical Center (VUMC) in Nashville, Tennessee, told delegates. 'I want to ask how we extend beyond the boundaries of being a traditional radiologist within the confines of our imaging centres and hospitals, and step out into the community and be advocates for civil action,' he said. 'And how radiologists can take the lead in promoting the health of the planet, because when we do [...] that comes back to benefit the care of the patients we provide.'



© malp - stock.adobe.com

Focusing on empathy

Radiologists should focus on patient experience, which includes their emotions and perceptions, and understand the role of empathy. 'It's important to have the ability to step out of our shoes,' the expert said. Everyone who has experienced the healthcare system knows how frustrating it can be to navigate, he went on. However, working with a human-centered design approach could help ease the process. 'Instead of starting with data, we have to start with people,' he said. 'Once we can define what people need, we can

address the right problem to come up with ideas that we then can prototype. We can try to generate ideas, test them live, learn from that and make it better.'

In January 2020, VUMC brought together residents, patients, radiologists, administrators and nurses to address health equity. Participants were asked in rapid fire fashion to write down what they would see, feel or do when faced with a given situation. 'We can define where the pain points are and vote on them,' Omary said. 'This will tell us where

the real places are where we can make the most difference and then we can generate big ideas that can solve the pain points in any system we're trying to design.'

The group came up with three tangible outcomes and developed:

- a curriculum for health equity for all medical residents at Vanderbilt;
- a set of micro grants where members of the radiology department can partner with community members to promote health equity;
- a health equity lectureship, named after its founder, the late Matthew Walker III, a respected community activist.

Radiology might also take cues from providers in other industries, for example Netflix or Amazon, who offer their customers suggestions based on their purchase history. 'It's about how we use technology to benefit our patients, their families and the referring physicians, and how we can go beyond the expectations, so that our patients and our referring physicians start sharing stories about us,' he said.

Going beyond the system

Radiologists must also expand outside the healthcare system to promote health and wellbeing, the expert went on. Some radiologists have stepped out of their traditional roles to support the community in ways that are unrelated to radiology, Omary said, providing his audience with three examples:

- Dr Virginia Joy Simmons, a radiologist in southern California, has amassed one of the most important collections of African-American art in the country. She has served on the board of many arts organisations as well as the

board of trustees for Stanford University.

- Professor Jocelyn D. Chertoff is Chair of the Department of Radiology at Geisel School of Medicine, Dartmouth, and she serves on the board of a non-profit organisation that addresses climate change.
- Dr Amy Patel, a breast radiologist in Missouri, is a strong advocate for promoting women's health and bringing more access to healthcare in her community. She was recently deemed by the Kansas City Chiefs American football team as Fan of the Year in recognition of her activist work.

'These leaders have stepped outside to make a difference,' Omary said. 'Be a leader in your community, and you're going to help radiology, and beyond that, the planet.'

Establishing 'green teams'

Climate change is the single biggest health threat facing humanity, according to the WHO, and healthcare is an important contributor to greenhouse gas emissions. 'If healthcare as a sector were a nation, we would be the fifth largest emitter of greenhouse gases,' he said. 'That means we have a lot of work to do.'

Physicians and nurses are among the most trusted professions in the world and radiologists should build on that, he argued. 'Our patients and community members expect us to be on top of things that will affect them. It's our responsibility to address planetary health because the health of the planet is going to affect our community and unfortunately, like Covid, it will disproportionately affect those without access to resources. It becomes a health

equity issue.' Many articles on sustainability and climate change have been published in 2022, showing the growing interest from radiologists, and this number should rise in the next few years, Omary predicted. He encouraged everyone to take action, including radiologists, to power down monitors and save energy, and educate about climate change in the curricula and at work. 'We can partner with our entire supply range and ask what they do to limit their carbon footprint, and establish green teams in our departments, hospitals and communities,' he concluded. ■

Report: Mélanie Rouger

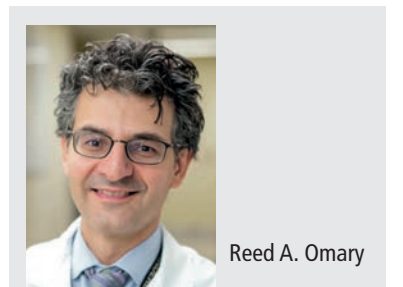
Scan now for a Virtual Experience!

**ACCUTRON®
CT-D VISION.
SIMPLY MORE.**

Accutron® CT-D Vision. The diagnostics specialist that can do more. More comfort, more mobility, more operating safety. More integration through Injection Data Sharing with RIS/PACS connection. View now at medtron.com

MEDTRON AG

Hauptstrasse 255 · 66128 Saarbruecken
www.medtron.com



Reed A. Omary

Reed A. Omary, MD, MS, is the Carol D. and Henry P. Professor and Chair of the Department of Radiology at Vanderbilt University Medical Center (VUMC) in Nashville, Tennessee. He has more than 20 years of experience as a practicing interventional radiologist, NIH-funded scientist, and educator. Omary is an avid public speaker who enjoys promoting sustainability and innovation in healthcare for national radiology organizations and for the public. Nationally, he serves as President of the Association of University Radiologists and President-elect of the Society of Chairs of Academic Radiology Departments.

Good-bye “surgery first”

Interventional radiology: out of the shadow and into the light

Using imaging guidance, interventional radiology – a sub-discipline of diagnostic imaging – allows targeted and ultraprecise diagnostic and therapeutic procedures without anesthesia and without large incisions. Nevertheless, surgery continues to be widely considered the procedure of choice, making interventional radiology the Cinderella of the discipline. Professor Dr. Marco Das, Medical

newer procedures such as MWA were relegated to the sidelines. Today, transarterial chemoembolization (TACE) is more tightly integrated. In this procedure, small particles and chemotherapy materials are applied directly into the blood vessel feeding the tumor. It is also indicated for therapy-refractory HCCs. While cryoneurolysis is still in the early stages, it is a promising alternative for out-patient management of chronic pain.



CT-guided microwave ablation of a metastasis in colorectal carcinoma with follow-up after intervention showing complete ablation of the metastasis to be treated.



Prof. Dr Marco Das performing CT-guided microwave ablation.

Director of the Department of Diagnostic and Interventional Radiology at Helios Klinikum Duisburg, Germany, however, thinks it is high time for Cinderella to take center stage: at Radiologiekongress Ruhr (RKR), he presented new therapy approaches for interventional radiology – and afterwards he kindly took the time to answer EH questions.

With regard to in-patient care, buzzwords are minimal volumes, out-patient care and centralization. Interventional radiology reduces length of stay or doesn't even require hospital admission at all. What does that mean for your discipline in the clinical context?

This is indeed a development interventional radiologists should wel-

come. We have to increase the visibility of the potential of interventional radiology as we can offer a broad range of minimally invasive procedures for a broad range of patients, for example prostate artery embolization, geniculate artery embolization, endovascular treatment of PAD or uterine artery embolization. We could create out-patient services for these procedures but we are currently facing major resource issues, in particular staff shortages.

What is the current and future role of artificial intelligence (AI) in interventional radiology?

While everybody is talking about AI, its practical use is still very limited. Regularly, support systems are launched, for example vessel imaging to facilitate embolization. But many hospitals simply don't have the financial resources to purchase such systems. The potential of AI is huge, down to robotics. AI to support prognoses or non-invasive tumor characterization would be particularly interesting. The future

will show which AI approaches will prevail in clinical routine.

Let's have a look to the crystal ball: in your opinion, how is – and how should – interventional radiology be changing?

Interventional radiology will become more visible and use its range of methods to benefit the patients. Research results will increasingly find their way into the guidelines, which means that more and more colleagues will adopt the new knowledge. In short: interventional radiology has a bright future. My personal wish? That colleagues and policy makers alike are open-minded since our healthcare system has to be flexible enough to integrate new methods. ■

Interview: Sonja Buske



Professor Dr. Marco Das

Professor Dr. Marco Das has been Medical Director of the Department of Diagnostic and Interventional Radiology at Helios Klinikum Duisburg, Germany, since 2017. He studied in Düsseldorf and did research at Harvard's Brigham and Women's Hospital. Das has a Master of Business Administration and in 2018 he was appointed Professor (apl) at the University of Düsseldorf.

EH: Professor Das, which new concepts are currently influencing interventional radiology?

Professor Das: The new concepts are primarily results of the current guidelines, particularly regarding hepatocellular carcinoma (HCC) and the treatment of colorectal cancer (CRC). While these concepts are not new, they are playing an increasingly important role in the treatment plans. Particularly ablations such as radio frequency ablation and microwave ablation (MWA) have yielded excellent results with regard to local tumor control proving the idea of “surgery first” obsolete. Rather, the optimum therapy should be selected based on individual tumor site and patient parameters, such as number of lesions, liver function or albumin-bilirubin level. This approach has indeed been integrated in the 2022 BCLC guidelines for HCC and in the 2022 ESMO guidelines for CRC. Moreover, there are new approaches to pain management, for example nerve cryoablation.

How far have these concepts advanced? Are the methods already being used or are they mere theory?

The treatment concepts for HCC and CRC are mature. With the traditional focus being on surgery,

HOLOGIC

Panther® Scalable Solutions


Scalable growth today and tomorrow

Consolidate your assay menu - 24 CE-IVD assays available


- Sexually transmitted infections
- Viral load
- Transplant
- Respiratory
- SARS-CoV-2
- Hospital-acquired infections

- Vaginal health
- Cervical health
- Gastrointestinal panels*
- Open Access for Lab Development Tests


Visit us at booth C4-20 at
ECCMID 2023
Copenhagen, Denmark




PANTHER®




ADD FUSION



ADD PLUS



ADD LINK




ADD TRAX®

*in development, not for sale

CE EC REP Hologic BV, Da Vinciiaan 5, 1930 Zaventem, Belgium. EC REP details wherever applicable

ADS-03882-EUR-EN Rev 001 © 2023 Hologic, Inc. All rights reserved. Hologic, Panther, Panther Fusion, Panther Plus, Panther Link, Panther Trax and associated logos are trademarks and/or registered trademarks of Hologic, Inc., and/or its subsidiaries in the United States and/or other countries. This information is intended for medical professionals and is not intended as a product solicitation or promotion where such activities are prohibited. Because Hologic materials are distributed through websites, eBroadcasts and tradeshow, it is not always possible to control where such materials appear. For specific information on what products are available for sale in a particular country, please contact your local Hologic representative or write to euinfo@hologic.com



Scan the QR Code to learn more

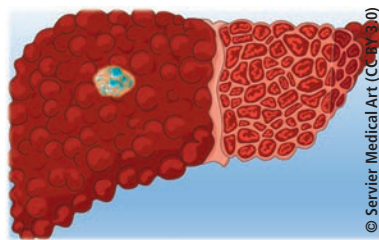
Sponsored • Promising combination: AFP, AFP-L3, DCP and GALAD score

Enhanced early detection of liver cancer

Worldwide, about one million people are suffering from hepatocellular carcinoma (HCC). In Germany alone, there are 9,000 new patients each year, most of them men between 50 and 60 years. When liver cancer is detected early, the prognosis is excellent, says Professor Dr. Ali Canbay, Director of the Medical Clinic at the University Hospital /Knappschaftskrankenhaus Bochum. While, unfortunately, current methods for early detection are insufficient, Fujifilm Wako recently presented an approach

Professor Canbay considers promising: a combination of AFP, AFP-L3, DCP and GALAD score.

HCC, the most frequently occurring malignant liver tumor, can be caused inter alia by cirrhosis and nonalcoholic fatty liver diseases. Since many patients are obese, sonography is often inadequate. "Thus, we need non-invasive markers to be able to detect the tumor early," Professor Canbay points out and adds that "Small tumors can quite easily be removed surgically or be treated with other types



Primary hepatocellular carcinoma in a cirrhotically remodelled liver.

of interventions. Once the cancer has spread across the liver, however, there are very few treatment options left."

Any decision regarding the appropriate treatment, Canbay underlines, should be made by physicians with comprehensive hepatology expertise: "We have to determine exactly whether the liver can compensate for the removed tumor. While the liver is the organ with the highest regeneration capacity, liver failure can occur if not all complications are duly considered prior to the treatment."

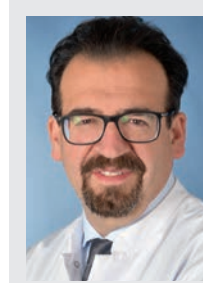
Tests without GALAD score are ineffective

Many hospitals conduct only the lab tests AFP-L3 and DCP under their early detection protocol – an approach Canbay considers insufficient: "When one test is negative, the other might well be positive. Only the combination with the

innovative GALAD score, which takes the patient's age and gender into consideration, can really exclude HCC. The combination of the test parameters is crucial."

In Bochum, the tests have been conducted for more than two years. Canbay himself was involved in the GALAD study. Patients from all over Germany present in his department to have this test done – which to date is available only in very few hospitals. "Despite the promising results, the health insurers don't cover the costs for the test yet," Canbay explains and adds that "We could detect HCC much more often in the early stage which improves the prognosis." He considers the test a necessity since "25 percent of the population have metabolic syndrome. Moreover, the number of immigrants from countries with a higher rate of viral hepatitis infections is increasing. Thus, we need to integrate the tests as soon as possible in the routine."

He hopes that in two or three years' time the health insurers will have changed their minds and pay for the test. It would make sense since a positive test result makes further time-consuming and expensive tests superfluous. "We can't perform an MRI scan every six months – that's far too expen-



Professor Dr. Ali Canbay

Professor Dr Ali Canbay is Director of the Medical Clinic of the University Hospital/Knappschaftskrankenhaus Bochum, Germany. He is a specialist physician for internal medicine and gastroenterology and holds additional qualifications in internal/critical care medicine, transplantation medicine and targeted tumor therapy.

sive. But we can determine the GALAD score regularly to understand the development and detect an evolving HCC early." Moreover, patients who undergo timely and successful treatment enjoy a high quality of life and even can resume working. Thus, the test is a win-win option. ■

Report: Sonja Buske



The μTASWako i30 processes the tests for the early detection of HCC.

Cervix, vulva and vagina

More certainty with methylation tests for early detection of cancer

A second-generation lab test for early detection of cervical cancer is the most recent addition to Oncnostics' portfolio. In particular, the company's solution will help women in countries with limited cancer screening. Moreover, new research on the early detection of vulval and vaginal cancer might soon enable the development of tests for these cancers.

In 2015, Oncnostics, a then three-year-old University of Jena spin-off, launched GynTect, a test for the early detection of cervical cancer. It uses DNA methylation as a biomarker that occurs specifically in cervical cancer or its precursors. At that time, GynTect was one of the first solutions worldwide to apply this technology to the early detection of cancer. Today, the test is marketed in several European countries and in August 2022, it was approved in China.

Since GynTect detects six methylated DNA regions, a maximum of ten samples can be processed at a time which makes GynTect more resource-intensive than conventional lab tests. Consequently, the

test is less suitable for use in countries with little or no screening and limited lab equipment. Thus, Oncnostics developed a second generation of the test which was presented at last year's Medica: ScreenYu Gyn. As it detects only one methylated DNA region it can be more easily automatized and up to 100 samples can be analysed in one batch. It was approved in May 2022 but is not being used yet. 'Currently, we make the test available only to interested researchers,' says Dr Alfred Hansel, co-founder and CEO of Oncnostics, and adds 'while we did our own study with 600 samples, we want to have the test verified by an independent third party.' ScreenYu Gyn does not yet reach its predecessor's accuracy; nevertheless, it is an alternative for developing countries and rural and remote areas. Dr Hansel points out that 'most new cancers occur in countries with little screening. There, our tests could be a useful tool.'

Self-pay service

In Germany, the tests are currently a self-pay service, i.e., the costs of the tests are not covered by statutory health insurers but have



Dr Alfred Hansel with his lab tests for the early detection of gynaecological cancers.

to be paid by the women themselves. Particularly women with a suspicious pap smear or a positive HPV test are interested in the Oncnostics test to get an unambiguous result before the gynaecologist repeats the test three to twelve months later. 'A suspicious

test result does not necessarily mean cancer,' Dr Hansel explains and adds that 'abnormal tissue and HPV infections usually heal by themselves; therefore physicians tend to wait and recheck after a certain period of time. For many women, this time of uncertainty

means enormous mental stress, so they use our test to clarify the initial finding. GynTect not only reliably detects existing tumours; it can also provide information on the probability of cervical cancer.'

Early detection of vulval and vaginal cancer

To date, there is no test for the early detection of vulval and vaginal cancer. Due to the unspecific symptoms, it is usually an incidental finding. A methylation test using the same biomarkers as the cervical cancer test might be a solution, as Hansel and his team found in initial studies with a few hundred samples from two university hospitals. 'Currently, our test recognizes 80 to 90 percent of all cancers, and we fully expect to reach 100 percent soon,' the CEO says. In two years at most, he estimates, that goal will be reached since he and his team are focusing their full efforts on the project. If the health insurers start to pay for the test, the development might even be faster than with the previous two tests since there are no alternatives. ■

Report: Sonja Buske

Specialized immune cells

Detection of ,invisible' cancer

Scientists from Leiden University Medical Center (LUMC) and Netherlands Cancer Institute (NKI) have discovered how specialized immune cells can detect and remove cancers that are 'invisible' to the conventional defense mechanisms of the immune system. Their work has been published in Nature. The findings could lead to novel cancer immunotherapies.

Normally, the recognition of abnormal cells in our body is a task for T cells, one of the most important white blood cells of the immune system. These cells can recognize many types of abnormalities, including viral and bacterial infections. But the immune system sometimes has trouble detecting cancer cells.

Cancer cells are only recognized by T cells if a specific molecule is attached to their surface. In order to escape immune recognition, some cancers lack such molecule and become 'invisible' to T cells.

Some patients with invisible cancers respond very well to cancer immunotherapies

Recently, researchers of the LUMC and NKI stumbled upon a strange phenomenon: some patients with 'invisible' cancers respond very well to cancer immunotherapies. These therapies rely on antibodies that activate or reinvigorate the activity of T cells. "Since these cancers lack the molecules which enable T cells to identify them, we did not understand why patients responded so well to the therapy," says Noel de Miranda, Associate Professor at LUMC Department of Pathology.

Research on cells drawn from patients that were treated at NKI now shows that $\gamma\delta$ (gamma delta) T cells – a lesser known, specialized immune type of cell – are capable of detecting cancers that

are invisible to conventional T cells. De Miranda: "This shows that there is a backup system in our immune system.

When the main way of recognizing tumor cells does not work, we have a second line of defense. Our findings could eventually lead to new treatments

for 'invisible' tumors with $\gamma\delta$ T cells." "We are only beginning to unveil the tremendous potential that $\gamma\delta$ T cells carry for the development of novel cancer immunotherapies", says Emile Voest, Professor of Medical Oncology, group leader at the Netherlands Cancer Institute and Onco Investigator.

How do immune cells work in the body of cancer patients?

"Going forward, we will try to gain a better understanding of how these immune cells work in the body of cancer patients, and how we can make use of them to develop novel immunotherapies. They will be particularly important

to treat cancers that are not susceptible to elimination by 'conventional' T cells."

The research is funded by Onco Institute and the European Research Council.

Source: Leiden University Medical Center



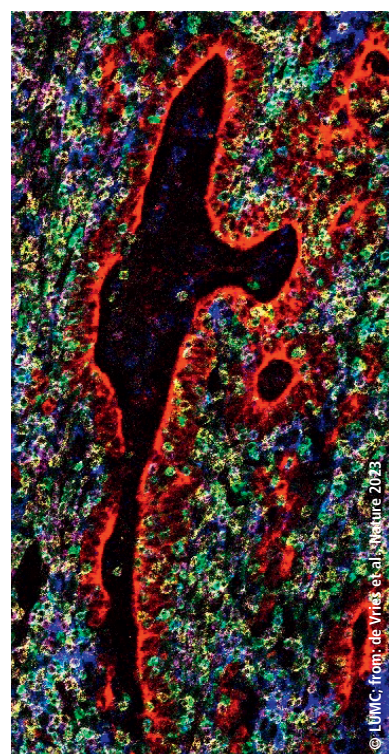
**TAKE CARE
STAY SAFE**

VACUETTE®
Safety Products

For more than 20 years Greiner Bio-One offers a wide range of innovative safety products for different requirements to provide the best possible protection for both caregivers and patients.

www.gbo.com

Greiner Bio-One GmbH / Kremsmünster, Austria / E-MAIL office@gbo.com
We are a global player / Find the contact details of your local partner on our website.



Colorectal cancer cells (in red) surrounded by a multitude of immune cells following responses to cancer immunotherapy. $\gamma\delta$ T cells were shown to directly interact with cancer cells and to be involved in their recognition and elimination.

Breast cancer diagnostics

Precision pathology: an AI-led alternative to molecular diagnostics



Precision pathology using Artificial Intelligence can provide an effective alternative to molecular diagnostics.

Experts have highlighted how precision pathology using Artificial Intelligence can provide an effective alternative to molecular diagnostics. This, say a team from the Karolinska Institutet (KI) in Stockholm, Sweden, can also offer multiple advantages within a clinical setting and support risk stratification.

Mattias Rantalainen, an Associate Professor and Research Group Leader in the Department of Epidemiology and Biostatistics at the Karolinska Institutet, detailed how AI-based precision pathology is a cost-effective alternative to

gene expression-based assays for breast cancer diagnostics. Speaking at the 9th Digital Pathology and Artificial Intelligence Congress in London, Rantalainen told delegates that routine histopathology assessment can lack precision in identifying patients with high risk for disease progression that could benefit from chemotherapy.

During his presentation, he outlined how AI-based precision pathology can discriminate high-risk from low-risk patients in a more cost-effective way. He said the digital transition enables AI-based phenotyping, stratification and offers decision support solutions.

Less result variability, more safety and efficiency

Rantalainen heads a research group focussing on digital medicine, particularly in the area of tissue pathology and exploring how these models can be used by pathologists and oncologists. 'Our main interest in AI precision pathology is that it improves routine pathology in terms of decision support, reduction in inter-assessor and inter-lab variability, increased safety with an automated second reader and has efficiency gains,' he said.

In addition, AI-based precision diagnostics utilizes deep learning

to look beyond what the human eye can see from images and extract information from large data sets for risk stratification, prognostic and treatment predictive models. 'This enables us to leverage digital pathology slides together with AI to extract specific information for research and for stratification of patients,' he added. That facilitates AI-based phenotyping for subtyping and subgroup analysis with standardized morphological phenotypes and can also capture intra-tumour heterogeneity information. This, he added, is cost effective and scalable.

Project overview

The group's activities range from early-stage research to clinical translation and implementation. It involves a KI umbrella project CHIME (Cancer Histopathology Image Epidemiology project); ABCAP (Advancing Breast Cancer histopathology towards AI-based Personalised medicine), with a focus on breast cancer precision pathology with partners in the Nordic Countries; and SWAIPP (Swedish AI Precision Pathology), with a focus on translation and implementation with 11 partners across healthcare, industry, academia and patients. It has routes to clinical implementation of AI-based precision pathology, from research to clinical translation of regulatory approved solutions using breast cancer as an initial implementation case.

Meanwhile, CHIME incorporates design of new studies, data generation, and links with registry-based clinical data and other phenotypes,

along with precision medicine and AI-based computational pathology research.

Rantalainen underlined the importance of a large retrospective population representative studies with real-world data, and clinical information including outcomes from national registries. 'Based on this collection of data, we then focus on developing various solutions from those studies,' he said. 'An in-house infrastructure and team drives studies from start to finish and has close collaborations with clinicians and industry.'

Deep learning to improve risk stratification

The expert cited two studies that demonstrate how deep learning can be used to improve risk stratification for intermediate risk breast cancer patients.

One looked at improving breast cancer histological grading using deep learning to provide relevant clinical decision making by training a simple model to learn these representations and then apply that type of model to stratifying an NHG2 intermediate risk group of patients into high and low risk group. Another research paper that the group used concentrated on predicting molecular phenotypes from histopathology images.

The KI group has now taken this academic research into the Stratipath clinical solution for risk stratification for breast cancer patients.

A new phenotype modality

In conclusion, Rantalainen said: 'AI-based precision pathology can be an alternative to molecular diagnostics with multiple advantages in the clinic.' He indicated that histopathology images provide a completely new phenotype modality for precision medicine applications that are information-rich, captures spatial variability, scalable and cost-effective in terms of lab-based assays. 'The key is to be able to do this in large population representation studies,' he continued, adding that the approach offers numerous applications in routine pathology, precision medicine and for patient stratification. ■

Report: Mark Nicholls



Mattias Rantalainen

Mattias Rantalainen is Associate Professor and Research group Leader in the Department of Epidemiology and Biostatistics at the Karolinska Institutet in Stockholm, Sweden.

mgo fachverlage

Publisher
mgo fachverlage GmbH & Co. KG
E.-C.-Baumann-Str. 5
95326 Kulmbach/Germany
Phone +49 (0) 9221 949-311
Fax +49 (0) 9221 949-377

Managing Directors:
Walter Schweinsberg, Bernd Müller

Editor and Production Manager:
Sonja Buske (SB)
Phone: +49 201 1775092
E-Mail: s.buske@mgo-fachverlage.de

Editor:
Wolfgang Behrends (WB)

Founded by Heinz-Jürgen Witzke
ISSN 0942-9085

Correspondents
Austria: Michael Krassnitzer (MK)
Belgium: Bernard Banga (BB)
Germany:
Cornelia Wels-Maug (CWM)
Dr Christina Czeschik (CC)
Great Britain:
Mark Nicholls (MN)
Spain:
Mélisande Rouger (MR)
USA: Cynthia E. Keen (CEK)

Subscriptions
Simone Sesselmann
kundenservice@mgo-fachverlage.de
Subscription rate
4 issues: 32 Euro, Single copy: 8 Euro.
Printed by: mgo360 GmbH & Co. KG,
Bamberg, Germany

Publication frequency: quarterly

Representatives
Germany, Austria, Switzerland:
Ralf Mateblowski
Phone: +49 201 1775094
E-Mail:
r.mateblowski@mgo-fachverlage.de

France, Italy, Spain: Eric Jund
Phone: +33 493 58 77 43
E-Mail: jund@european-hospital.com
GB, Scandinavia, BeNeLux:
Simon Kramer
Phone: +31 180 6200 20
E-Mail: kramer@european-hospital.com
Taiwan: Charles Yang
Phone: +886 4 232 236 33
E-Mail: medianet@ms13.hinet.net
USA & Canada:
Hanna Politis, Media International
Phone: +1 301 869 66 10
E-Mail: hanna@media-intl.com
Maria Kaiser
Phone: +1 250 726 4007
E-Mail: mkads@mac.com

All company, brand and product names in this publication are the property of their respective holders. Users must obtain permission from those holders before copying or using the owner's trademarks, product and company names or logos.

Digital pathology

Cutting the time to therapy for breast cancer patients

Centralized review of slides combined with telepathology has opened up the potential for a dramatic reduction in the waiting times for breast cancer patients to start their therapy. Jan Hudecek from the Netherlands Cancer Institute outlined his team's framework for multi-centre clinical trials with centralized digital pathology review at the 9th Digital Pathology and Artificial Intelligence Congress in London in December. He explained how that has been applied to four phase II trials, which appears to have had a significant impact on patient experience and treatment.



Jan Hudecek

Jan Hudecek is a software engineer at the Netherlands Cancer Institute and is passionate about the impact software can make when working closely with expert researchers. At the institute, he develops Slide Score to help pathologists with the research workflow after first-hand experience with issues surrounding the collection of research data from cohorts of histopathology slides. His career spans industry and academia with experience in data visualization, user interface design and bioinformatics.

informed consent from the patient and biopsies of metastatic lesions, the H&E staining and quality check on the tumour cells/stroma before a high-resolution scan took one day.

The digital scoring by a least three pathologies and randomization within 72 hours gave a dramatic cut in time for TNBC patients to therapy.

During the process, the scanned slides were sent to Slide Score, a web-based platform with a central manager checking the quality of slides. They were then sent to the pathologists who would score the slides within the platform. The central manager would check and return the results from WSIs (whole slide images) with accompanying structured reporting forms.

Learning extensions with AI

Hudecek said the process has opportunities for learning extensions with the ability to train local pathologists and also add in an AI element as 'new readers'.

A further proposal is for all TNBC patients in the Netherlands – around 3000 a year – to be scored by AI algorithms using SIPA (spatial immune-ecology prognostic assessment) with the results integrated into the platform to screen for eligibility for enrolment in trials via an AI score.

'What was important overall from this project is that it showed the ways it can be a benefit for patients,' he added. 'A wait of around 14 days for therapy is shortened to 49 hours and that has been validated in three



© Dvarg - stock.adobe.com

The waiting times for breast cancer patients to start their therapy could be reduced by a centralized review of slides combined with telepathology.

additional trials. With digital pathology and structured data collection where multiple remote experts can

efficiently collaborate and learn, it opens the possibility of new workflows and new scales of working in

general in pathology.' ■

Report: Mark Nicholls

During his presentation, the Dutch software engineer discussed the outcomes of the trials and its further potential to train local pathologists via feedback from experts on their assessments and add AI readers into the plan. Hudecek said the concept has a 'direct impact on patients by speeding things up and improving the quality of care'.

He outlined the TONIC clinical trial on metastatic triple negative breast cancer (TNBC) patients, assigned two different treatment arms: those undergoing treatment with doxorubicin followed by nivolumab, or just nivolumab. Randomization stratified those with sTILs (stroma tumour infiltrating lymphocytes) with 5% cut off (determined in stage one) and scored by four expert pathologists. 'The outcome was progression free survival,' said Hudecek.

Digitalisation greatly speeds up the process

The expert highlighted how the switch to digital pathology had made such a major difference. 'The original timing of shipping glass slides and Excel data collection was taking upwards of 14 days,' he said. 'What pathologists proposed was to use digital pathology instead and use integrated structured reporting. That took the whole process down to below 72 hours.' Following

FUJIFILM
Value from Innovation

Wako

μTASWako i30

+ Measurement of AFP-L3% and DCP by microfluidic electrophoretic separation

+ Risk assessment for development of Hepatocellular Carcinoma (HCC)

FUJIFILM Wako Chemicals Europe GmbH

Fuggerstr. 12 • 41468 Neuss • Germany
Phone +49 2131 311 272 • Fax +49 2131 311 110

diagnostika@wako-chemicals.de
www.wako-chemicals.de

Centralised image library and archive

From regional to national: digital pathology network transformation

Transforming a regional digital pathology network into a national programme across the UK has the potential to save the NHS around £100m a year. Such a network – one that sees a centralised digital pathology image library and archive, as opposed to individual hospitals having their own infrastructure and teams to manage it – can also offer a range of other benefits alongside significant cost savings.



A digital pathology network can save money and offer a range of other benefits.

The savings potential was raised by Basharat Hussain, Deployment Director for NPIC (National Pathology Imaging Co-operative) at Leeds Teaching Hospitals NHS Trust, as he outlined the opportunities and challenges of expanding a regional digital pathology network into a national programme across England. Speaking at the opening of the 9th Digital Pathology and Artificial Intelligence Congress in London in December, Hussain detailed how the NPIC grew out of the work of the renowned digital pathology department in Leeds.

That growth initially expanded the network across West Yorkshire and then into other areas of northern England before taking in the national paediatric pathology network, coordinated by Great Ormond Street Hospital in London, and the soft tissue network, including other hospitals in Birmingham, Manchester, Sheffield, Liverpool

and elsewhere in the country. It is now one of the largest digital pathology and AI programs in the world, he said.

Increase in demand

Hussain reminded delegates that Leeds has been at the forefront of digital pathology for 20 years, having built the first gigapixel display for digital pathology (Powerwall), developed the Leeds Virtual Microscope and undertook academic research to drive clinical use of digital pathology in the NHS, as well as embracing AI. Highlighting how the project developed, he said: 'Funding has been a challenge and we are working in a period of an increase in demand – with less pathologists being trained, and more nearing retirement age

– so the experience has made us more aware of ongoing sustainability issues around pathology.'

The initial phases saw £10m of funding, with £7m in industry co-funding, to deploy digital pathology at six regional hospitals for 750,000 slides a year and 1.2 petabytes (PBs) of data, along with establishing a training and education centre.

That scope further expanded to cover 30 hospitals, 300 pathologists, up to 2.4m slides a year, and deploying over 40 scanners from the original 15, with 4PBs of storage, Hussain continued. He pointed out challenges along the way, including space constraint for scanners in busy laboratories, while other considerations included storage capacity and data transference

to repositories, scanning magnification and image retention, the number of users to access the system, performance level expectations, procurement decisions, integration, the decision to opt for a separate software and hardware vendor and to adopt a non-Cloud solution.

Among the lessons learned, Hussain pointed out the production of the Leeds Guide to Digital Pathology, a how-to guide for others to learn the lessons of a massive digital pathology scale-up. Beyond that, he emphasises the need for scanners with DICOM image format, excellent connectivity, a strong PACS platform, and a robust and scalable operation.

Instant sharing for second opinions

The system sees patient samples processed in the laboratory with a glass slide created and transformed into a digital image that is ingested into the central infrastructure linked to the hospital, and is available to pathologists to access. 'The digital image enables the pathologist to make their diagnosis and to present to clinicians at multidisciplinary teams (MDTs) so the patient gets the right diagnosis and treatment,' he continued. 'The solution also enables second opinions as images can be shared instantly with pathologists hundreds of miles apart.' However, he emphasised that the solution had to meet certain requirements: it must align with the terms of a green UK-based

data centre, offer adequate storage capacity, a long-term archive tier, disaster recovery, back up and scalability to give rapid time to value for NPIC customers. 'The scale up capabilities allow for growth of the platform as more trusts and organisations are onboarded,' he added.

Today, with dual data centres providing real-time replication and 20 petabytes of storage, the NPIC network has the capability to store seven million whole slide images (WSIs). 'The infrastructure is scalable to multi-exabyte levels and we have the potential to capture and store all WSIs across the UK and keep them for over 30 years,' said Hussain.

'There will be seamless site-to-site image sharing which is instantly available to hospitals in the NPIC network and we also have the potential to improve turnaround times for cancer diagnosis, faster deployment of AI capabilities, and continue with research capabilities – for example, the recent work with Genomics England to scan the 100,000 Genomes project – and support clinical trials. And, given the economies of scale, it could save the NHS £100m.' With plans to onboard all current NHS partners by the end of 2023, the aim is to continue with IT investment, improve archiving, and reach out to further regions that have expressed an interest in joining the digital pathology network. ■

Report: Mark Nicholls

Technology transition

Netherlands Cancer Institute switches to new digital pathology platform

The Netherlands Cancer Institute (NKI), one of the top 10 comprehensive cancer centers in Europe, will deploy a diagnostic platform from digital and computational pathology solutions provider Proscia, the company announced.

The platform, Concentriq Dx is designed to expand digital pathology practice, laying the foundation for its pathologists to deliver personalized diagnoses that better inform treatment decisions. In doing so, the cancer center, which houses an internationally acclaimed research institute, will generate additional pathology data that can lead to clinical breakthroughs, Proscia predicts.

Digital pathology, which shifts the 150-year-old standard of care from microscope to whole slide image, is increasingly powering routine diagnosis as expectations for precision medicine intensify the impact of the pathologist shortage and rising cancer burden. An early adopter, NKI recognized that

scaling its digital operations to further deliver on its commitment to excellent patient care would require moving away from its legacy software system. It selected the enterprise-grade Concentriq Dx to serve as the modern platform at the center of its growing oncology practice.

Bringing more pathology data into its practice

CE-marked under IVDR, Concentriq Dx is a singular, secure digital pathology platform that drives primary diagnostic and other routine workflows across the connected laboratory.* NKI will draw on the platform's interoperability to unify images from disparate scanners, bringing more pathology data into its practice. With live and asynchronous collaboration and remote image viewing, the solution helps pathologists to broaden access to specialists in an effort to provide higher quality diagnoses. The platform also offers interoperability with third-party image analysis applications, allowing NKI to identify

clinically impactful patterns, and is designed for realizing the promise of pathology's computational future.

"Concentriq Dx will empower us to chart our path towards full digitization," said José van den Berg, Head of the Department of Pathology at NKI. "The modern, enterprise-grade platform will enable us to increasingly combine expertise and insight to drive precision diagnosis. Our multidisciplinary teams work to provide personalized treatment for all patients, and our pathology data plays an integral role in achieving this aim."

In addition to informing diagnoses, pathology data factors heavily into biomedical research that leads to new therapies and other breakthroughs that advance precision medicine and improve patient care. NKI's internationally acclaimed research institute works closely with its dedicated cancer center to create maximum impact for patients through foundational and



The Netherlands Cancer Institute building in Amsterdam.

translational clinical studies. By scaling its digital pathology practice, NKI is paving the way to unlock even more value from its growing volume of data by increasingly incorporating it into research initiatives. "We are thrilled to help NKI take the next step on its digital pathology journey with Concentriq Dx," said Arun Ananth, Proscia's Chief Commercial Officer. "As we continue to expand our presence

in Europe, we look forward to working with a world-class team that is committed to its patients through excellent clinical care and groundbreaking research."

*Concentriq Dx is CE-marked under IVDR and is available for primary diagnosis in the US during the Covid-19 public health emergency. ■

Source: Proscia

Sponsored • Outlook for 2023

Hygiene in endoscopy: What's next?

For many endoscopy wards, 2022 has been a year of transition and transformation. The field saw the advent of innovative reprocessing techniques, but also increasing strain due to personnel shortage and the demand for greater sustainability. We spoke with Paul Caesar, Reprocessing and Infection Control Leader EMEA at Pentax Medical, about the company's upcoming solutions for the year ahead.

EH: From your perspective, what have been the most important developments in the past year? How will they affect the field of endoscopy in 2023?

Caesar: 'One of the biggest challenges we have to face is an ongoing and upcoming staff shortage in healthcare. Of course, this also affects endoscopy and endoscope reprocessing units, which in turn can have an impact on the quality of life for many patients. From that perspective, one of our challenges at Pentax Medical is how to improve the quality and efficiency in endoscope reprocessing.

'Another major topic is sustainability – not only for us as a manufacturer, but also for hospitals. We all need to find ways to reduce our ecologic footprint and impact on the environment. Endoscopy has a long way to go in this regard: daily waste is about 3 kg per bed. Therefore, it is important to redesign endoscopy so we can contribute to a more sustainable endoscopy ward. A more sustainable method for reprocessing is an integral part of that development.'

Hygiene is often achieved with disposables, which is at odds with the goal of greater sustainability. Are there ways to reconcile these contradicting demands?

'When discussing the environmental impact of endoscopy and reprocessing, we need to look at how chemicals and water are used. Another debate is focused on the use of single use vs. reusable endoscopes. At Pentax Medical, we believe we found a way to have the best of both worlds: our approach – which we call "The Power of Choice", can offer the best solution for any specific patient. A single-use endoscope might be the most sensible tool for specific cases where vulnerable patients are involved, e.g. in the emergency room. Other cases might call for a completely reusable colonoscope, or a semi-disposable instrument,



The PlasmaTYPHOON+ is an innovative and automated system to improve the drying process of endoscopes.

for example for an endoscopic retrograde cholangiopancreatography (ERCP).

'To offer this kind of flexibility, we have designed our semi-disposable duodenoscope ED34-i10T2. This is a reusable endoscope with a disposable elevator cap (DEC). The DEC is disposed after use and the rest of the endoscope can be reprocessed again. This makes sense, since the distal end with its elevator construction is one of the most vulnerable parts of the endoscope in terms of infection risk, and at the same time it is a very difficult part to clean. Replacing only the DEC makes cleaning the distal end of the endoscope much easier for the staff, saves time, and also minimises the risk of infection for the patient.

'Of course, there will always be a discussion on how much disposables in healthcare are actually needed. I think everyone agrees that we should not go back to cleaning syringes again and use them on the next patient. We now rightfully only employ single use products here, which enhances patient safety. Naturally, this is not so clear-cut in every other aspect. On the one hand, we should

always be aware of the risk of infection; on the other hand, we should strive for greater sustainability where it can be achieved. At the end of the day, it's about striking a balance between safety, sustainability, and efficiency. In a real-life clinical setting, we also need to factor in the costs, so any solution must fit a hospital's budget.'

Many hospitals suffer from personnel shortage, while the actual workload only seems to increase. Can technology help to mitigate this pressure?

'Automation can support the staff doing their job more efficiently. It may help reduce repetitive actions, which leads to a more economic and sustainable way of working. Another great advantage of automation is standardisation and reducing the human error factor, which is especially important in times of staff shortage. And when it helps the staff, it's also beneficial for the patient.

'For example, we have designed the PlasmaTYPHOON+ to improve the drying process of endoscopes. This is an innovative and automated device which offers new possibilities. With its user-friendly

UI, it guides the staff through the procedure, minimising errors and saving time. Using the system, the drying process can be completed in only three minutes instead of the usual 90-to-120-minute cycle of an automated drying cabinet. So, in that way we are changing the reprocessing cycle to make it more convenient for the staff, but also safer for the patient.'

What about staff training?

'Of course, even if there is a shortage of staff, users must always be educated and trained on using the devices – not only once when implementing it, but also as repeated refreshers. Training the doctors is important when there is a new endoscope. However, the instrument normally comes with a new technique or something else that also has an impact on the reprocessing staff. Unfortunately, these people tend to be forgotten in the implementation process. We think this should be improved by offering them not only initial training, but also rehearsal trainings.'

Taking into account all of the previous points, what is your outlook on endoscopy for 2023? Can you give us a sneak preview for your company's plans?

'I think it will be a very interesting and important year for us at Pentax Medical. There will be new exciting and unique innovations, like endoscopes and processors, with enhanced possibilities and improved ergonomics but also on reprocessing.

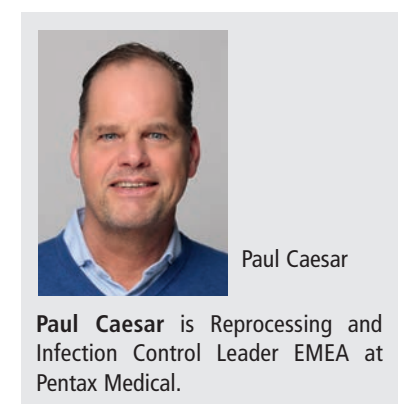
'More upcoming milestones are in the field of device reprocessing and disinfection. Since recently, we are distributors of a new system developed by UV Smart which uses ultraviolet (UV-C) light for the disinfection of ENT channel-less

endoscopes and TEE-probes in just 60 seconds. Even including the cleaning stage, this means that the endoscope or probe is completely ready for use again after only 5-10 minutes. I think this has a positive impact on equipment availability, on quality and efficiency and, therefore, will also benefit patient care. We will also build upon a new and exciting technique by further improving the cleaning stage in the endoscope reprocessing cycle. While we cannot go into details just yet, we are aiming for a launch of this system in the first half of 2023. I think this device will greatly contribute to standardise processes and reduce daily staff workload.

'2023 will also see a new chapter for our training programme, the Pentax Medical Forward Academy: We believe that proper training is key for hygiene and infection control, so we will offer dedicated reprocessing trainings. We know from our partners' feedback how travelling costs and tight staff schedules in endoscopy wards are among the main challenges for external training participation. To address this, we are thinking about in-company trainings, balancing and combining on-site training with online education modules.' (WB)



In the semi-disposable duodenoscope ED34-i10T2, the elevator cap is designed as a disposable component



Paul Caesar is Reprocessing and Infection Control Leader EMEA at Pentax Medical.

Hospital program: Returning Seniors to Orthopedic Excellence (RESTORE)

Facilitate recovery from hip fracture surgery

Caregivers at the University of Texas Southwestern Medical Center in Dallas, Texas, have developed a programme designed to facilitate recovery by geriatric patients following hip fracture surgery. The Returning Seniors to Orthopedic Excellence (RESTORE) programme is designed to provide stellar comprehensive collaborative co-managed care for older

adults with orthopaedic injuries.

The Global Burden of Diseases, Injuries, and Risk Factors Study estimates that globally, 178 million new fractures occurred in 2019. Of these, 14.2 million were hip fractures – a 107.4% increase in women and a 76.0% increase in men since 2009. Hip fractures are a major cause of disability and

dependency in the elderly. Twenty-five percent of elderly patients die within a year after fracturing a hip, and 33% require transition to a more restricted living environment, according to research conducted by the Italian National Research Council's Neuroscience Institute.

Megan Sorich, DO, an orthopaedic surgeon and the director of RESTORE, became interested in developing a programme that might help reduce these sobering statistics. She was awarded a geriatric trauma fellowship after her surgical residency and joined UT Southwestern Medical Center in 2019 with the goal of establishing an outstanding Fracture Liaison Programme.

A multi-specialty team with a collective goal

RESTORE was launched in February 2021. To obtain programme approval, Sorich discussed its benefits with hospital administrators, to show that this would be cost saving, and that its implementation could potentially reduce the time from emergency department (ED) processing to surgery, and length of stay. She sought support from key stakeholders in geriat-

RESTORE and NICHE treatment recommendations

- After diagnosis, offer a regional anaesthesia block (fascia ilicus) to manage pain prior to surgery and to potentially help decrease the need for narcotic pain medication. Avoid excessive medication throughout a patient's stay to help prevent delirium.
- Perform surgery as soon as the patient is medically able to undergo the procedure, preferably within 24 hours of hospital admission.
- Start mobility procedures on the same day surgery is performed, with early ambulation at least three times daily as soon as the patient can be weight-bearing.
- Maintain judicious pain control and ice/cold packs on incision 24/7.
- Toilet use as soon as possible. Establish a sleep-conducive environment at bedtime hours for patients to have a regular sleep schedule. Discourage daytime sleeping with activities and daylight environment.

ric medicine, hospital medicine, orthopaedics, anaesthesia, physical therapy, and emergency medicine.

The RESTORE team is very diverse, and includes physician specialists in emergency medicine, internal medicine, geriatrics, anaesthesiology, and pain management, as well as nutritionists, physical and occupational therapists, discharge planning coordinators, geriatric resource nurses, and geriatric patient care associates. Sorich says that the team works cohesively to help establish standardized

patient care, to expedite patients to surgery, and to better manage post-surgical care. Their collective goal is to reduce length of stay, reduce in-hospital mortality rates, and reduce postoperative complications of patients who have fractured their hips.

Sorich and colleagues describe the procedures adopted by UT Southwestern in detail in Geriatric Nursing, starting with emergency department "fast-tracking" a patient suspected of having fractured a hip to the radiology department, to



The RESTORE programme involves starting mobility measures on the same day as the operation. Patients should try to walk at least three times a day.

RFA, MWA, CRYO and IRE under scrutiny

Thoracic interventions: emerging techniques

Experts presented state-of-the-art and emerging techniques to treat chest tumours and discussed common issues in the management of pneumothorax at RSNA 2022. Current ablation methods in the thorax include radiofrequency ablation (RFA), microwave ablation (MWA), cryoablation (CRYO), irreversible electroporation (IRE) and pulsed electric field.

Transbronchial thermal ablation is an investigational method that could be interesting for the treatment of lung tumours, said Professor Michael Lanuti, MD, Director of Thoracic Oncology for the Division of Thoracic Surgery and the Thoracic Surgery liaison to the Massachusetts General Hospital Cancer Center in Boston. 'Image-guided thermal ablation is already adopted as a tool in the armamentarium for oligometastatic disease, lung cancers or in case of failure of stereotactic radiotherapy,' he told the audience.

Thanks to new technology providing higher resolution, surgical teams can now navigate to the lesion site using electromagnetic navigation bronchoscopy or newer navigation platforms such as ION and Monarch. For real time confirmation of position, they can use cone beam CT or CT fluoroscopy, or ultrasound bronchoscopy when it is available. 'The main benefit for bronchoscopic ablation is that it can reach nodules in the middle lung



There are many new promising treatment options for tumours in the chest area, especially the lungs.

zone that cannot be reached with the percutaneous technique,' Lanuti said. 'If the bronchoscopic ablation is implemented with robotic navigation, the no-hand approach makes it possible to perform cone beam imaging without provider exposure to radiation.' The technique choice will depend on the lesion location – the concept of lung zone dependence, he explained.

Heat management in different tissues

'In the periphery, many of the approaches are applicable, but in the central zone, most are dangerous. This might be where image guided RFA or non-thermal pulsed

electric field can play a role,' he suggested, adding that there are other factors to consider before deciding on therapy. 'CRYO is associated with less pain for a lesion that is located along the pleura or for peripheral location close to the chest wall.'

Heat management is a factor for the percutaneous approach as well as transbronchial thermal ablation. 'There's the suspicion that microwave could mitigate this phenomenon,' Lanuti said. 'But CRYO is usually preferred for lesions abutting airways.' Transbronchial thermal ablation should be performed in tumour locations that allow for it. 'The propagation of heat or cold

is unreliable in a tissue where you had previous radiation,' he said. Interstitial lung disease is under evaluation and thermal ablation coming down the airway might reduce the risk of pneumothorax. Transbronchial thermal ablation could be used as part of a one-stop-shop approach, where teams can diagnose and directly treat the lesions. 'We're still in the clinical trials. To be successful at this, you need to have a champion in your institution, and that can be either a pulmonologist or a thoracic surgeon. A lot of pulmonologists are moving in that space, as well as theragnostics interventionists, who can biopsy the lesion and treat it,' said Lanuti, who recommended using transbronchial thermal ablation for tumours smaller than 2 cm. 'The benefit is that it's repeatable, and with bronchoscope techniques, perhaps there's less pneumothorax. We need prospective studies to standardize the technique,' he concluded.

Chest tube management

In the following talk, Maria Lucia Madariaga, MD, Assistant Professor of Surgery at the University of Chicago, focused on the finishing touches of chest tube placement after pneumothorax (PX), an action that is required in 2 to 15% of all PX cases. 'When a patient has a lot of soft tissue or they're obese and you put a pig tail in, the pig tail could migrate out of the pleural phase even though it may look like it's still attached to the skin,' she said.

The two most important things to remember in this scenario are how to tape the tube to the patient and how to secure the chest tube connections, she explained. 'A loose chest tube stitch could also have fatal consequences. It's very important in your daily examinations of the patient to make sure that attachments are attached to the patient. Bad stitching of the chest tube can lead to chest tube falling out. Once you saw the tube in, whether you do a single stitch at skin level or Roman sandal technique, make sure the tube is not able to move in and out.'

A Heimlich valve sometimes comes as part of the chest tube in surgeon kit as a way to evacuate air. However, some surgeons may be confused as to what to do with it, Madariaga said. 'One common misconception is that the valve is placed in series with the whole chest tube contraction. You don't need to use this valve unless you're taking the patient home.' A bad tape job is when the connection is obscured. 'The tubing connecting to the pleurevac and the tubing connecting to the patient could be completely disconnected within this tape monster and you would never know,' she said. A good way to secure connection is to make it visible, 180 degrees from the tubing and to use one single line of tape. 'Using tie bands at the connection sites can also show you that the connection is secure and visible,' she suggested.

by geriatric patients

admission to the Acute Care for Elders (ACE) unit, and through pre- and post-surgical treatment. This treatment includes pain, mobility, and feeding management, establishing bowel and sleeping regimens, initiating delirium prevention, and planning post-fracture care. The team has developed a pamphlet for the patient and family members detailing what to expect during the entire hospital stay, nutrition goals to enhance recovery, expectations regarding pain and pain management, and strategies to prevent delirium and falls that could cause another fracture.

Positive reception and unforeseen obstacles

As of October 2022, 152 patients have been treated in the RESTORE programme. The average time to the operating room from emergency department admission is 16 hours, whereas prior to programme implementation 44 hours elapsed before surgery. Patients typically stay five days in the hospital before being discharged, generally to a rehabilitation facility. The programme has been well received. 'We have had great recognition and enthusiasm

from the hospital administration,' says Sorich. 'Patients and their family members have been very pleased with the care provided by our excellent nursing team, who also practice evidence-based Nurses Improving Care for Health System Elders (NICHE) best care practices as well as the RESTORE protocols.'

Sorich tells European Hospital that there was one unforeseen obstacle during initial implementation in the spring of 2021. 'Our large 800-bed hospital has twelve different inpatient floors. Because of this, having all of the geriatric hip fracture patients on the same floor is important not only from the nursing education and care

perspective, but also from the discharge planning and care coordination standpoint. To make sure that all of the hip fracture patients admitted as inpatients ended up on the same floor requires that the ED department diagnosis was "hip fracture". The ED staff had been used to using the terms "heart failure", "fall", and "diabetes-related",

none of which would identify the patient as having a hip fracture. After the ED started to regularly use this diagnosis term, our inpatient coordinators assigning beds have been able to make sure that our hip fracture patients are on the same ACE hip-fracture unit.' ■

Report: Cynthia E. Keen

Connection check for long-time intubated patients

After the tube has been placed, it is kept either on suction, to make sure that the lung is fully adhered to the chest wall, or on waterseal, as an intermediate step when suction is not necessarily needed. On their daily rounds, medical teams should assess for crepitus at the site of the chest tube, she recommended. 'If the patient is on positive pressure ventilation or unstable, you might consider not taking the tube out.'

Looking at the chest tube itself, teams should check the tape to make sure it's secured to the skin. 'If a patient has been intubated for a long time, those stitches might erode through the skin and it might be able to come out quickly,' the expert cautioned. 'Make sure that all the connections are intact, because if you're trying to assess for an air leak, for example, you won't have an accurate reading if there's a kink in your tube.'

Looking at the pleurevac or any other device connected to the chest tube, teams should watch out how much volume is coming out in a 24-hour period. 'You won't take out the tube if there's too much volume. Another sign of the chest tube functioning is if the water column on your pleurevac is tidaling when you open it.' ■

Report: Mélisande Rouger

PENTAX[®]
MEDICAL

SEE THE FUTURE
THROUGH EVERY
ENDOSCOPE
GENERATION

INSPIRA

PENTAX Medical INSPIRA™ Video Processor

The bridge for legacy endoscopes to next level image quality.

The gateway to tomorrow's cutting-edge technology in diagnosis and therapy.

Learn more at inspira.pentaxmedical.com



Inspired by
#PENTAXMedicalTripleAim

Sponsored • No complications

Hip arthroplasty for femoral neck fractures

Arthroplasty for femoral neck fractures has seen enormous progress in recent years, but complications due to infections are still a major problem. With good preparation and the right technique, however, orthopaedic surgeons can take away much of the horror of this scenario. At the Heraeus Symposium as part of the German Congress of Orthopaedics and Trauma Surgery (DKOU), three experts discussed the most important risk factors and how they deal with them.

'Hip surgery – it has to be said – is high-risk surgery,' Prof Ulrich Liener introduced his audience to the topic. Studies place the complication rate for femoral neck fracture treatments at 75%, with more than every tenth patient requiring repeated surgery. In this context, the Head of the Clinic for Orthopaedics, Trauma Surgery and Sports Traumatology at the Marienhospital in Stuttgart emphasised the role of infectious complications in particular: 'It's a disaster for the patients,' he put it succinctly. Higher mortality, reduced mobility, severe pain – all in all, a significant reduction in the quality of life, which also negatively

the actual surgical technique,' the expert emphasised.

In addition, antibiotic-loaded bone cement has been shown to be an effective tool for infection control, Liener explained. Studies have shown how patients benefit from cemented arthroplasty in femoral neck fractures; compared to cementless stem anchorage, it significantly lowers periprosthetic fracture rates, prolonging the implant's life by a factor of 3 to 4. Also, mortality over the entire period of hospitalisation decreases, the expert pointed out. 'Cement is not only an effective means of fixing the prosthesis in place, it is also a good vector to deliver antibiotics to where they are needed in a highly concentrated way.' In particular, high-dose, double-loaded bone cement (gentamicin and clindamycin; G+C) shows longer and broader effects. 'I have been using this cement for a long time in all my high-risk and elderly patients because it greatly reduces the infection rate.'

Strong representation of patients over 75

Following up, Prof Dieter Christian Wirtz also picked up on the importance of patient age: 'In patients



According to studies, the complication rate in the treatment of femoral neck fractures is 75%, and more than every tenth patient requires a second operation.

hip arthroplasties, the expert clarified, referring to current figures: 'This is mainly due to periprosthetic fractures, which has an increased

results therefore argue in favour of implants with a matte surface (Ra <math><2.5 \mu\text{m}</math>), which create a firm bond with the bone cement and thus reduce the risk of fractures.

The expert also recommended the use of dual-mobility cups – especially for older patients. This type of implant also benefits from cemented fixation, and Wirtz once more emphasised the advantages of antibiotic-loaded bone cement in this context: 'It may of course be a matter of cost, but the evidence clearly speaks in favour of it.' He also addressed concerns regarding antibiotics leading to increased formation of resistant pathogens. These have not been confirmed, the expert pointed out.

The third speaker of the symposium, **Univ Prof Dr Nils Hailer** emphasised the special role of Germany in cemented arthroplasty. For example, PMMA – also known as Plexiglas –, which is today widely used as bone cement, was invented here, the head of the Department of Orthopaedics, Trauma and Hand Surgery at Uppsala University Hospital listed. In addition, Hamburg University Medical Center was among the first to add antibiotics to the bone cement. Given this pioneering role, the expert found it curious that the technique is hardly used in operations in Germany: 'We should cement a lot more,' was his assessment.

How to achieve a successful "whiteout"

In addition to the differentiation of the patient groups – regarding to age, gender and comorbidities – the correct cementing technique is crucial for treatment success. To illustrate, Hailer showcased the "whiteout" as a distinct quality feature: If done correctly, no tran-

sition between the cemented endoprosthesis and the cortical bone is visible on the X-ray. To achieve this, the bone is first sealed distally with an intramedullary stopper. 'Not only does this prevent the appearance of unsightly "cement sausages", but the stopper also enables thorough irrigation and retrograde filling of the medullary canal.' The subsequent pressure irrigation clears the spongy bone of fat and blood particles. 'This prevents fat embolisms and allows interdigitation of the cement into the bone.'

Finally, the shaft is filled in a retrograde fashion with bone cement – applied distally to the stopper and then filled proximally. This technique prevents air bubbles from getting into the bone cement, which could later lead to cracks. Optimal interlocking with the bone is then ensured by proximal medullary sealing, which allows the bone cement to be further solidified with the necessary pressure. 'This is seen later on the X-ray as a whiteout.' After this, the stage is set for the insertion of the endoprosthesis – Hailer urges his colleagues to be patient during this step, because air bubbles can also form in the cement coat if the stem is inserted too quickly. The curing time of the bone cement of about twelve minutes must be observed for the repositioning, otherwise the torsion of the stem changes and can lead to instability.

Perioperative complications

Despite the occurrence of Bone Cement Implantation Syndrome (BCIS), mortality is lower in cemented patients, as previously shown by Liener. Nevertheless, it is important to differentiate the patient group in advance: Elderly, male and multimorbid patients represent a particularly fragile group, calling for an adapted approach to the cementing technique, Hailer cautioned. BCIS-related complication can be prevented even in vulnerable patient groups through thorough pressure irrigation of the bone even before insertion of the medullary plug, renewed irrigation with plenty of fluid as well as dispensing with proximal medullary sealing and maximum pressure build-up. Last but not least, Hailer highlighted the advantages of the lateral approach for hemi (HEP) and total endoprostheses (TEP), which reduces the risk of dislocation by three to five times compared to the dorsal approach. ■

Report: Wolfgang Behrends



From left: Prof Nils Hailer, Prof Dieter Christian Wirtz, Prof Ulrich Liener

affects the clinic and the surgeon.

Good preparation makes all the difference

However, careful pre-planning of any procedure can go a long way to improve the chances of success, Liener noted. For example, diabetes – a high-risk factor for the development of infections – can often be modified by adjusting the HbA1c value to >7.5% in the last 24 hours before surgery. Other factors include antibiotic prophylaxis, treatment of pre-existing infections, limiting surgery duration, regular changing of gloves during surgery and well-adjusted patient blood management (PBM). 'These are all rather simple measures that can be implemented without great effort but reduce the risk of infection enormously – probably even more so than by changing

over 75 years, osteoarthritis is – after high blood pressure – the second most common condition requiring treatment, even more so than diabetes or coronary heart disease,' said the expert from the Clinic and Polyclinic for Orthopaedics and Trauma Surgery at Bonn University Hospital. Accordingly, this age group accounts for a large proportion of hip replacements – about 41.6% of the more than 147,000 annual procedures are performed on patients over 75. This poses an additional challenge for arthroplasty: older patients frequently suffer from deficits in primary stability due to osteoporosis, cognitive and motor impairments, a higher risk of dislocation and falls, and are also more frequently affected by complications during surgery.

Cementing can noticeably reduce the revision rate for elective total

occurrence rate in cementless technique procedures for patients aged 75 upwards'. Especially women with osteoporosis within this age group benefit significantly from the use of cement, Wirtz said. This also applies to patients with femoral neck fractures. Here, too, registers show a significant advantage of cemented treatment.

Implant surface: polished or matte?

The choice of implant surface can also prevent complications, the expert continued: so-called Exeter implants with a highly polished surface (Ra <math><0.1 \mu\text{m}</math>) do not bond with the surrounding bone cement, but jam in the surrounding mantle. This axial migration can lead to longitudinal cracks in the cement mantle. 'Especially in older patients, this significantly increases the risk of periprosthetic fractures.' Study